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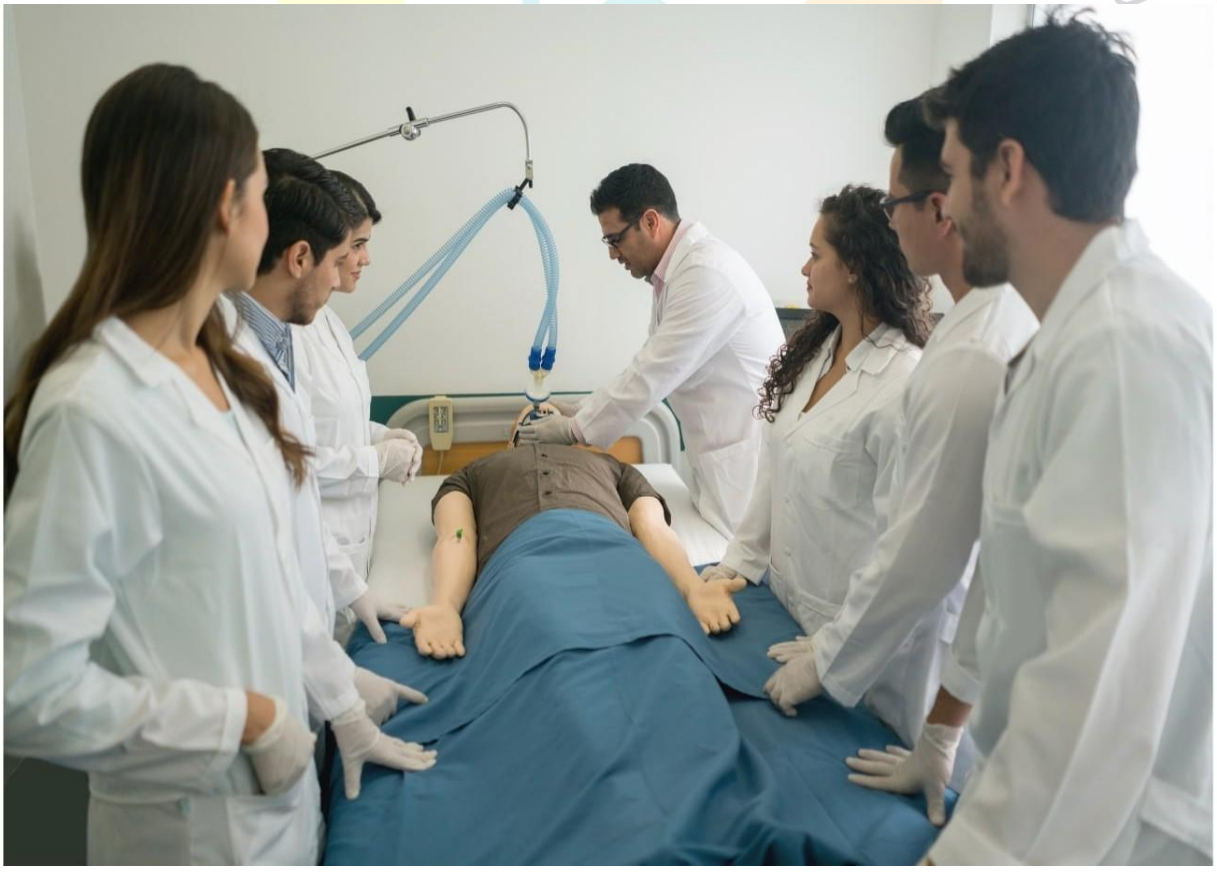
National Commission for Allied and Healthcare Professions

COMPETENCY BASED CURRICULUM

for

"PHYSICIAN ASSOCIATES"



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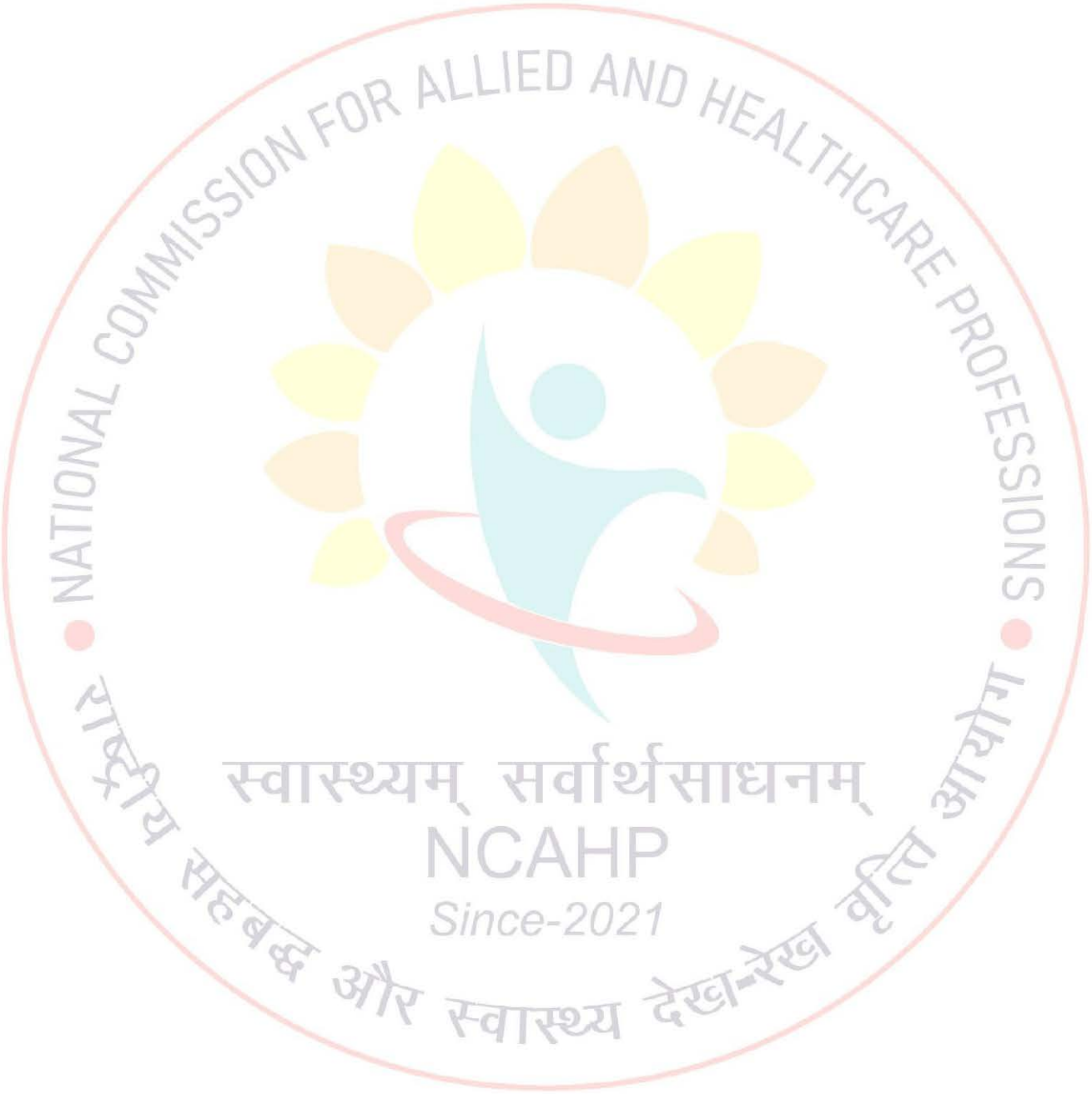
Ministry of Health & Family Welfare



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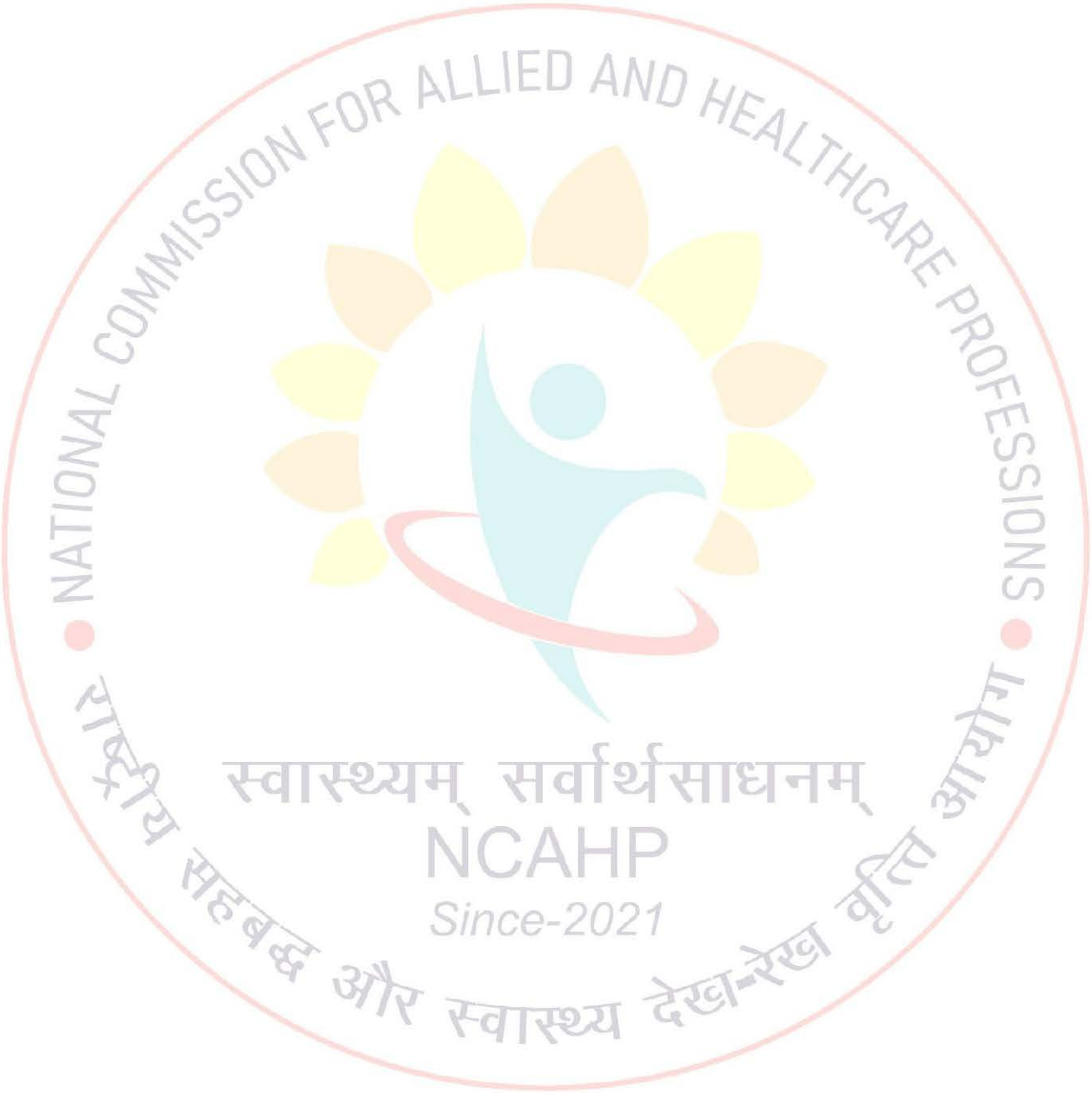
List of Abbreviations

ABC	Airway Breathing Circulation
ABG	Arterial Blood Gas
ACE	Angiotensin Converting Enzyme
ACLS	Advanced Cardiovascular Life Support
ADH	Anti Diuretic Hormone
ADL	Activities of Daily Living
ADR	Adverse Drug Reactions
AHP	Allied Health Professional
AI	Artificial Intelligence
ANOVA	Analysis of Variance
ARB	Angiotensin Receptor Blocker
ATP	Adenosine Triphosphate
AV	Atrio Ventricular
BLS	Basic Life Support
BMI	Body Mass Index
BP	Blood Pressure
BPA	Bachelor of Physician Associate
BV	Bacterial Vaginosis
CABG	Coronary Artery Bypass Grafting
CATS	Credit Accumulation and Transfer System
CBCS	Choice-Based Credit System
CBD	Case-based discussion
CD	Compact Disc
CDSCO	Central Drugs Standard Control Organization
CEO	Chief Executive Officer
CEX	Clinical Evaluation Exercise
CNS	Central Nervous System
CO_2	Carbon Dioxide
CONSORT	Consolidated Standards of Reporting Trials
COPD	Chronic Obstructive Pulmonary Disease
COTPA	Cigarettes and Other Tobacco Products Act
CPR	Cardiopulmonary Resuscitation

CPU	Central Processing Unit
CRF	Case Report Form
CRISPR	Clustered Regularly Interspaced Short Palindromic Repeats
CT	Computed Tomography
DASH	Dietary Approaches to Stop Hypertension
DKA	Diabetic Keto-Acidosis
DNA	Deoxy Ribonucleic Acid
DNR	Do Not Resuscitate
DOP	Day Of Pregnancy
DVT	Deep Vein Thrombosis
ECG	Electrocardiogram
ECMO	Extracorporeal Membrane Oxygenator
ECTS	European Credit Transfer and Accumulation System
EDC	Electronic Data Capture
ELISA	Enzyme Linked Immunosorbent Assay
ENT	Ear Nose Throat
ERV	Expiratory Reserve Volume
FVC	Forced Vital Capacity
GFR	Glomerular Filtration Rate
GPCR	G-Protein Coupled Receptors
HDL	High Density Lipoprotein
HIV	Human Immunodeficiency Virus
ICU	Intensive Care Unit
IPE	Inter Professional Education
IRV	Inspiratory Reserve Volume
IUCD	Intra Uterine Contraceptive Device
JCI	Joint Commission International
K+	Potassium
MD	Doctor of Medicine
MIC	Minimum Inhibitory Contraception
MMR	Measles Mumps Rubella
MOU	Memorandum of Understanding
MPA	Master of Physician Associate
MRI	Magnetic Resonance Imaging

MS	Microsoft
MTP	Medical Termination of Pregnancy
Na+	Sodium
NAAC	National Assessment and Accreditation Council
NABH	National Accreditation Board for Hospital
NCAHP	National Council for Allied and Healthcare Professionals
NCD	Non-Communicable Diseases
NEET	National Eligibility cum Entrance Test
NFHS	National Family Health Survey
NIAHS TSU	National Initiative for Allied Health Sciences – Technical Support Unit
NICU	Neonatal Intensive Care Unit
NOAEL	No Observed Adverse Effect Level
NSCLC	Non-Small Lung Cancer
NSDA	National Skill Development Agency
NSQF	National Skills Qualification Framework
NST	Nonstress Test
NTCP	National Tobacco Control Program
O_2	Oxygen
OCSE	Objective Structured Clinical Examination
OGTT	Oral Glucose Tolerance Test
OPD	Outpatient Department
OSLER	Objective Structured Long Examination Record
OSPE	Objective Structured Practical Examination
PA	Physician Associate
PANCE	Physician Assistant National Certifying Exam
PCR	Polymerase Chain Reaction
PHC	Primary Health Care
PhD	Doctor of Philosophy
PNS	Peripheral Nervous System
PPE	Personal Protective Equipment
PSA	Prostate Specific Antigen
RAM	Random Access Memory
RCT	Randomized Controlled Trial

RNA	Ribonucleic Acid
SA	Sino Atrial
SCLC	Small Cell Lung Cancer
SDL	Self Directed Learning
SPSS	Statistical Package for Social Sciences
STI	Sexually Transmitted Infection
TB	Tuberculosis
TCA	Tricarboxylic Acid Cycle
TNF	Tumour Necrosis Factor
TURP	Transurethral Resection of Prostate
TV	Trans Vaginal
UGC	University Grants Commission
UNICEF	United Nations Children‘s Fund
URL	Uniform Resource Locator
VATS	Video-Assisted Thoracic Surgery
VR	Virtual Reality
WBC	White Blood Cell



CHAPTER 1
Introduction to the Handbook

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1.0 Introduction to the Handbook

1.1 Introduction

The report _From Paramedics to Allied Health Professionals: Landscaping the Journey and Way Forward' that was published in 2012, marked the variance in education and training practices for the allied and healthcare courses offered by institutions across the country. This prompted the Ministry of Health and Family Welfare (MoH & FW) to envisage the creation of national guidelines for education and career pathways of allied and healthcare professionals, with a structured curriculum based on skills and competencies. Thus, this handbook has been designed to familiarize universities, colleges, healthcare providers as well as educators offering allied and healthcare courses with these national standards.

Individually, created for different professional groups of allied and healthcare, this handbook aims to reduce the variation in education by comprising of a standardized curriculum, career pathways, nomenclature and other details for each profession. The change from a purely didactic approach will create better skilled professionals and improve the quality of overall patient care. In the absence of a national standard-setting authority, this handbook can also guide the thousands of young adults who choose healthcare as a profession – not as doctors or nurses but to play several other critical roles – on the appropriate course of action to enable them to be skilled allied and healthcare professionals of the future.

1.2 Who is an Allied and Healthcare Professional?

The Ministry of Health and Family Welfare, accepted in its entirety the definition of an allied and healthcare professional based on the afore-mentioned report, though the same has evolved after multiple consultations and the recommended definition is now as follows-

'Allied and healthcare professionals (AHPs) includes individuals involved with the delivery of health or healthcare related services, with qualification and competence in therapeutic, diagnostic, curative, preventive and/or rehabilitative interventions. They work in multidisciplinary health teams in varied healthcare settings including doctors (physicians

Since the past few years, many professional groups have been interacting and seeking guidance on all those who would qualify under the purview of ―allied and healthcare professionals‖. In the healthcare system, statutory bodies exist for clinicians, nurses, pharmacists and dental practitioners; but a regulatory structure for around 50 professions is absent in India. Currently, the Government is considering these professions (as listed Annex- 1) under the ambit of the allied and healthcare system.

However, this number is subject to changes and modifications over time, particularly considering how quickly new technologies and new clinical avenues are expanding globally, creating newer cadres of such professionals.

1.3 Scope and need for allied and healthcare professionals in the Indian healthcare system

The quality of medical care has improved tremendously in the last few decades due to the advances in technology, thus creating fresh challenges in the field of healthcare. It is now widely recognized that health service delivery is a team effort involving both clinicians and non-clinicians, and is not the sole duty of physicians and nurses.[i] Professionals that can competently handle sophisticated machinery and advanced protocols are now in high demand. In fact, diagnosis is now so dependent on technology, that allied, and healthcare professionals (AHPs) are vital to successful treatment delivery.

Effective delivery of healthcare services depends largely on the nature of education, training and appropriate orientation towards community health of all categories of health personnel, and their capacity to function as an integrated team. For instance, in the UK, more than 84,000 AHPs, with a range of skills and expertise, play key roles within the National Health Service, working autonomously, in multi-professional teams in various settings. All of them are first- contact practitioners and work across a wide range of locations and sectors within acute, primary and community care. Australia's health system is managed not just by their doctors and nurses, but also by the 90,000 university-trained, autonomous AHPs vital to the system.[ii,iii]

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care, though the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long-term treatment ensures return to normal life. AHPs also play a significant role to care for patients who struggle mentally and emotionally in the current challenging environment and require mental health support; and help them return to well- being.[ii] Children with communication difficulties, the elderly, cancer patients, patients with long term conditions such as diabetes people with vision problems and amputees; the list of people and potential patients who benefit from AHPs is indefinite.
Thus, the breadth and scope of the allied and healthcare practice varies from one end to another, including areas of work listed below:

- Across the age span of human development from neonate to old age.
- With patients having complex and challenging problems resulting from systemic illnesses such as in the case of diabetes, cardiac abnormalities/conditions and elderly care to name a few.
- Towards health promotion and disease prevention, as well as assessment, management and evaluation of interventions and protocols for treatment.
- In a broad range of settings from a patient's home to community, primary care centers, to tertiary care settings; and
- With an understanding of the healthcare issues associated with diverse socio- economies and cultural norms within the society.

1.4 Learning goals and objectives

The handbook has been designed with a focus on performance-based outcomes pertaining to different levels. The learning goals and objectives of the undergraduate and graduate education program will be based on the performance expectations. They will be articulated as learning goals (why we teach this) and learning objectives (what the students will learn).

Using the framework, students will learn to integrate their knowledge, skills and abilities in a hands-on manner in a professional healthcare setting. These learning goals are divided into nine key areas, though the degree of required involvement may differ across various levels of qualification and professional cadres:

1. Clinical care
2. Communication
3. Membership of a multidisciplinary health team
4. Ethics and accountability at all levels (clinical, professional, personal and social)
5. Commitment to professional excellence
6. Leadership and mentorship
7. Social accountability and responsibility
8. Scientific attitude and scholarship (only at higher level- PhD)
9. Lifelong learning

1. Clinical Care[iv]

Using a patient/family-centered approach and best evidence, each student will organize and implement the prescribed preventive, investigative and management plans; and will offer appropriate follow-up services. Program objectives should enable the students to:

- Apply the principles of basic science and evidence-based practice
- Use relevant investigations as needed

- Identify the indications for basic procedures and perform them in an appropriate manner
- Provide care to patients – efficiently and in a cost-effective way – in a range of settings, and maintain foremost the interests of individual patients
- Identify the influence of biological, psychosocial, economic, and spiritual factors on patients‘ well-being and act in an appropriate manner
- Incorporate strategies for health promotion and disease prevention with their patients

2. Communication[iv,v]

The student will learn how to communicate with patients/clients, caregivers, other health professionals and other members of the community effectively and appropriately. Communication is a fundamental requirement in the provision of health care services. Program objectives should enable the students to:

- Provide sufficient information to ensure that the patient/client can participate as actively as possible and respond appropriately to the information
- Clearly discuss the diagnosis and options with patients, and negotiate appropriate treatment plans in a sensitive manner that is in the patients and society‘s best interests
- Explain the proposed healthcare service – its nature, purpose, possible positive and adverse consequences, its limitations, and reasonable alternatives wherever they exist
- Use effective communication skills to gather data and share information including attentive listening, open-ended inquiry, empathy and clarification to ensure understanding
- Appropriately communicate with, and provide relevant information to, other stakeholders including members of the healthcare team
- Use communication effectively and flexibly in a manner that is appropriate for the reader or listener
- Explore and consider the influence that the patient‘s ideas, beliefs and expectations have during interactions with them, along with varying factors such as age, ethnicity, culture and socioeconomic background
- Develop efficient techniques for all forms of written and verbal communication including accurate and timely record keeping
- Assess their own communication skills, develop self-awareness and be able to improve their relationships with others
- Possess skills to counsel for lifestyle changes and advocate health promotion

3. Membership of a multidisciplinary health team[vi]

The student will put a high value on effective communication within the team, including transparency about aims, decisions, uncertainty and mistakes. Team-based health care is the provision of health services to individuals, families, and/or their communities by at least two health providers who work collaboratively to accomplish shared goals within and across settings to achieve coordinated, high-quality care. Program objectives will aim at making the students being able to:

- Recognize, clearly articulate, understand and support shared goals in the team that reflect patient and family priorities
- Possess distinct roles within the team; to have clear expectations for each member‘s functions, responsibilities, and accountabilities, which in turn optimizes the team‘s efficiency and makes it possible for them to use division of labor advantageously, and accomplish more than the sum of its parts
- Develop mutual trust within the team to create strong norms of reciprocity and greater opportunities for shared achievement
- Communicate effectively so that the team prioritizes and continuously refines its communication channels creating an environment of general and specific understanding
- Recognize measurable processes and outcomes, so that the individual and team can agree on and implement reliable and timely feedback on successes and failures in both the team‘s functioning and the achievement of their goals. These can then be used to track and improve performance immediately and over time.

4. Ethics and accountability

Students will understand core concepts of clinical ethics and law so that they may apply these to their practice as healthcare service providers. Program objectives should enable the students to:

- Describe and apply the basic concepts of clinical ethics to actual cases and situations
- Recognize the need to make health care resources available to patients fairly, equitably and without bias, discrimination or undue influence
- Demonstrate an understanding and application of basic legal concepts to the practice
- Employ professional accountability for the initiation, maintenance and termination of patient-provider relationships
- Demonstrate respect for each patient's individual rights of autonomy, privacy, and confidentiality

5. Commitment to professional excellence[vii]

The student will execute professionalism to reflect in his/her thought and action a range of attributes and characteristics that include technical competence, appearance, image, confidence level, empathy, compassion, understanding, patience, manners, verbal and non- verbal communication, an anti-discriminatory and non-judgmental attitude, and appropriate physical contact to ensure safe, effective and expected delivery of healthcare. Program objectives will aim at making the students being able to:

- Demonstrate distinctive, meritorious and high-quality practice that leads to excellence and that depicts commitment to competence, standards, ethical principles and values, within the legal boundaries of practice
- Demonstrate the quality of being answerable for all actions and omissions to all, including service users, peers, employers, standard setting/regulatory bodies or oneself
- Demonstrate humanity during everyday practice by virtue of having respect (and dignity), compassion, empathy, honour and integrity
- Ensure that self-interest does not influence actions or omissions, and demonstrate regards for service-users and colleagues

6. Leadership and mentorship[viii]

The student must take on a leadership role where needed to ensure clinical productivity and patient satisfaction. They must be able to respond in an autonomous and confident manner to planned and uncertain situations and should be able to manage themselves and others effectively. They must create and maximize opportunities for the improvement of the health seeking experience and delivery of healthcare services. Program objectives should enable the students to:

- Act as agents of change and be leaders in quality improvement and service development, so that they contribute and enhance people‘s wellbeing and their healthcare experience
- Systematically evaluate care; ensure the use of these findings to help improve people‘s experience and care outcomes, and to shape clinical treatment protocols and services
- Identify priorities and effectively manage time and resources to ensure the maintenance or enhancement of the quality of care
- Recognize and be self-aware of the effect their own values, principles and assumptions may have on their practice. They must take charge of their own personal and professional development and should learn from experience (through supervision, feedback, reflection and evaluation)
- Facilitate themselves and others in the development of their competence, by using a range of professional and personal development skills

- Work independently and in teams. They must be able to take a leadership role to coordinate, delegate and supervise care safely, manage risk and remain accountable for the care given; actively involve and respect others' contributions to integrated person-centered care; yet work in an effective manner across professional and agency boundaries. They must know when and how to communicate with patients and refer them to other professionals and agencies, to respect the choices of service users and others, to promote shared decision-making, to deliver positive outcomes, and to coordinate smooth and effective transition within and between services and agencies.

7. Social Accountability and Responsibility[ix]

The students will recognize that allied and healthcare professionals need to be advocates within the health care system, to judiciously manage resources and to acknowledge their social accountability.[x] They have a mandate to serve the community, region and the nation and will hence direct all research and service activities towards addressing their priority health concerns. Program objectives should enable the students to:

- Demonstrate knowledge of the determinants of health at local, regional and national levels and respond to the population needs
- Establish and promote innovative practice patterns by providing evidence-based care and testing new models of practice that will translate the results of research into practice, and thus meet individual and community needs in a more effective manner
- Develop a shared vision of an evolving and sustainable health care system for the future by working in collaboration with and reinforcing partnerships with other stakeholders, including academic health centres, governments, communities and other relevant professional and non-professional organizations
- Advocate for the services and resources needed for optimal patient care

8. Scientific attitude and Scholarship[x]

The student will utilize sound scientific and/or scholarly principles during interactions with patients and peers, educational endeavors, research activities and in all other aspects of their professional lives. Program objectives should enable the students to:

- Engage in ongoing self-assessment and structure their continuing professional education to address the specific needs of the population
- Practice evidence-based by applying principles of scientific methods

- Take responsibility for their educational experiences
- Acquire basic skills such as presentation skills, giving feedback, patient education and the design and dissemination of research knowledge; for their application to teaching encounters

9. Lifelong learning[xi]

The student should be committed to continuous improvement in skills and knowledge while harnessing modern tools and technology. Program objectives will aim at making the students being able to:

- Perform objective self-assessments of their knowledge and skills; learn and refine existing skills; and acquire new skills
- Apply newly gained knowledge or skills to patient care
- Enhance their personal and professional growth and learning by constant introspection and utilizing experiences
- Search (including through electronic means), and critically evaluate medical literature to enable its application to patient care
- Develop a research question and be familiar with basic, clinical and translational research in its application to patient care
- Identify and select an appropriate, professionally rewarding and personally fulfilling career pathway elements in allied and healthcare education

1.5 New elements in allied and healthcare curriculum

1.5.1 Competency-based curriculum

A significant skill gap exists among healthcare professionals, regardless of their hierarchy or responsibility in healthcare settings. The variation in service quality is attributed to differing healthcare education methods and the gap between expectations of graduates post-course and in the workplace. While a course emphasizes what one is expected to "know," it is assumed that practical skills are learned through the job. Competency-based education bridges the gap between "know what" and "do how."

The effectiveness of any educational program relies on its curriculum design. With rapidly evolving medical knowledge, educators recognize that learning should go beyond memorizing facts, as knowledge may become outdated by the time a professional enters practice.

Competency-based education addresses this by equipping professionals with relevant skills and competencies needed for real-world practice. It focuses on learner-centered activities, continuous evaluation, and performance outcomes, contrasting with the traditional teacher-centered approach. Competency-based credentials depend on the demonstration of specific competencies, allowing stakeholders to set clear expectations.[xii] [xiii]

Considering the need of the present and future healthcare delivery system, the curriculum design depicted in this handbook will be based on skills and competencies.

1.5.2 Promoting self-directed learning of the professionals.

The shift in the focus from traditional to competency-based education has made it pertinent that the learning processes may also be revisited for suitable changes. It is a known fact that learning is no more restricted to the boundaries of a classroom, or the lessons taught by a teacher. The new tools and technologies have widened the platform and introduced innovative modes of how students can learn and gain skills and knowledge. One of the innovative approaches is learner-centric and follows the concept of **self-directed learning.**

Self-directed learning, in its broadest meaning, describes a process in which individuals take the initiative with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying resources for learning, choosing and implementing learning strategies and evaluating learning outcomes (Knowles, 1975).[xiv]

In self-directed learning, learners themselves take the initiative to use resources rather than simply reacting to transmissions from resources, which helps them learn more in a better way.[xv]

Lifelong, self-directed learning has been identified as an important ability for medical graduates (Harvey, 2003)[xvi] and so is applicable to other health professionals including AHPs. It has been proven through many studies worldwide that the self-directed method is better than the teacher-centric method of learning. Teacher-directed learning makes learners more dependent and the orientation to learning becomes subject-centered. If a teacher provides the learning material, the student is usually satisfied with the available material, whereas if a student is asked to work on the same assignment, he or she invariably has to explore extensive resources on the subject.[xv]

This handbook promotes self-directed learning, apart from the usual classroom teaching and opens the platform for students who wish to engage in lifelong learning.

1.5.2 Credit hours vs. traditional system

Recently the National Assessment and Accreditation Council (NAAC) and the University Grants Commission (UGC) have highlighted the need for the development of a Choice-Based Credit System (CBCS), at par with global standards and the adoption of an effective grading system to measure a learner‘s performance.[xvii] All the major higher education providers across the globe are operating a system of credits. The European Credit Transfer System (ECTS), the _National Qualifications Framework‘ in Australia, the Pan-Canadian Protocol on the Transferability of University Credits, the Credit Accumulation and Transfer System (CATS) in the UK as well as the systems operating in the US, Japan, etc. are examples of these.

Globally, a need now exists for the use of a fully convertible credit-based system that can be accepted at other universities. It has now become imperative to offer flexible curricular choices and provide learners mobility due to the popularity of initiatives such as _twinning programmes‘, _joint degrees‘ and _study abroad‘ programmes.[xviii]

To ensure global acceptability of the graduates, the current curriculum structure is divided into smaller sections with focus on hours of studying which can be converted into credit hours as per the international norms followed by various other countries.

1.5.3 Integrated structure of the curriculum

Vertical integration, in its truest sense, is the interweaving of teaching clinical skills and knowledge into the basic science years and, reinforcing and continuing to teach the applications of basic science concepts during the clinical years. (Many efforts called _vertical integration‘ include only the first half of the process).
Horizontal integration is the identification of concepts or skills, especially those that are clinically relevant, that cut across (for example, the basic sciences), and then putting these to use as an integrated focus for presentations, clinical examples, and course materials. e.g. Integration of some of the basic science courses around organ systems, e.g., human anatomy, physiology, pathology; or incorporating ethics, legal issues, finance, political issues, humanities, culture and computer skills into different aspects of a course like the Clinical Continuum.
The aim of an integrated curriculum is to lead students to a level of scientific fluency that is beyond mere fact and concept acquisition, using a common language of medical science, with which they can begin to think creatively about medical problems.[xix]
This innovative new curriculum has been structured in a way such that it facilitates horizontal and vertical integration between disciplines; and bridges the gaps between both theory & practice, and between hospital-based practice and community practice. The amount of time devoted to basic and laboratory sciences (integrated with their clinical relevance) would be the maximum in the first year, progressively decreasing in the second and third year of the training, making clinical exposure and learning more dominant.[xxi] However it may differ from course to course depending on the professional group.

1.5.4 Introduction of foundation course in the curriculum

The foundation course for allied and healthcare professions is an immersive programme designed to impart the required knowledge, skills and confidence for seamless transition to the second semester of a professional allied and healthcare course. Post admission, the foundation course is designed for a period of 6 months to prepare a student to study the respective allied and healthcare course effectively and to understand the basics of healthcare system. This aims to orient the student to national health systems and the basics of public health, medical ethics, medical terminologies, communication skills, basic life support, computer learning, infection prevention and control, environmental issues and disaster management, as well as orientation to the community with focus on issues such as gender sensitivity, disability, human rights, civil rights etc. Though the flexibility to the course designers have been provided in terms of – modifying the required numbers of hours for each foundation subject and appropriate placement of the subject across various semesters.

1.5.5 Learning methodologies

With a focus on self-directed learning, the curriculum will include a foundation course that focuses on communication, basic clinical skills and professionalism; and will incorporate clinical training from the first year itself. It is recommended that the primary care level should have sufficient clinical exposure integrated with the learning of basic and laboratory sciences. There should also be an emphasis on the introduction of case scenarios for classroom discussion/case- based learning.

Healthcare education and training is the backbone of an efficient healthcare system and India's education infrastructure is yet to gain from the ongoing international technological revolution. The report *'From Paramedics to Allied Health: Landscaping the Journey and way ahead'*, indicates that teaching and learning of clinical skills occur at the patient's bedside or other clinical areas such as laboratories, augmented by didactic teaching in classrooms and lecture theatres. In addition to keeping up with the pace of technological advancement, there has been a paradigm shift to outcome-based education with the adoption of effective assessment patterns. However, the demand for demonstration of competence in institutions where it is currently limited needs to be promoted. The report also mentions some of the allied and healthcare schools in India that have instituted clinical skill centres, laboratories and high-fidelity simulation laboratories to enhance the practice and training for allied and healthcare students and professionals. The report reiterates the fact that simulation is the replication of part or all of a clinical encounter through the use of mannequins, computer-assisted resources and simulated patients. The use of simulators addresses many issues such as suboptimal use of resources and equipment, by adequately training the manpower on newer technologies, limitations for imparting practical training in real-life scenarios, and ineffective skills assessment methods among others.[i] The table mentioned below lists various modes of teaching and learning opportunities that harness advanced tools and technologies.

Table 1 Clinical learning opportunities imparted using advanced techniques[i,xx]

Teaching modality	Learning opportunity examples
Patients	Teach and assess in selected clinical scenarios
	Practice soft skills
	Practice physical examination
	Receive feedback on performance
Mannequins	Perform acquired techniques
	Practice basic procedural skills
	Apply basic science understanding to clinical problem solving
Simulators	Practice teamwork and leadership
	Perform cardiac and pulmonary care skills
	Apply basic science understanding to clinical problem solving
Task under trainers	Monitor and terminate dialysis treatment, etc.

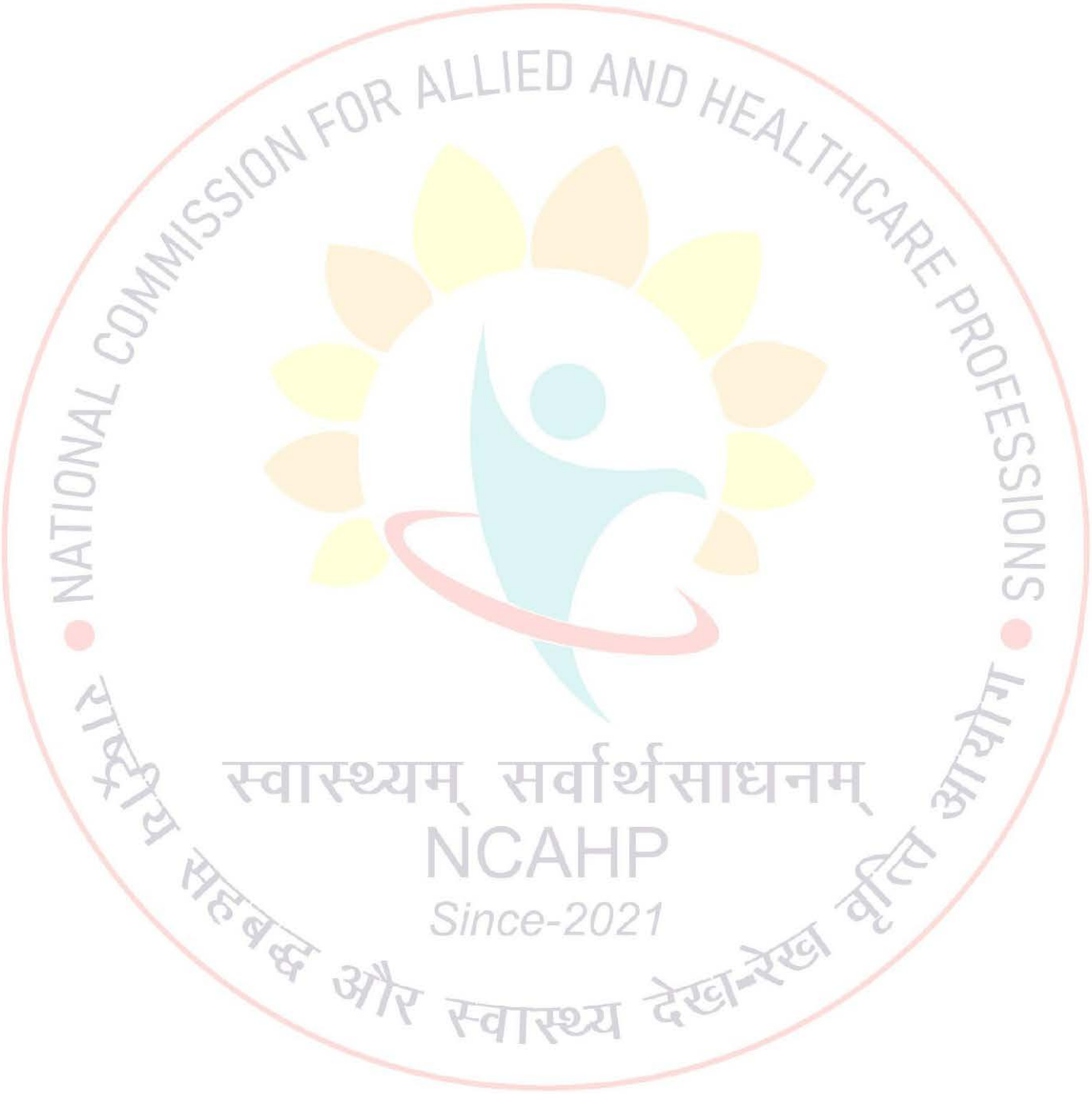
1.5.6 Assessment method

Traditional assessment of students consists of the yearly system of assessments. In most institutions, assessments consist of internal and external assessments, and a theory examination at the end of the year or semester. This basically assesses knowledge instead of assessing skills or competencies. In competency-based training, the evaluation of the students is based on the performance of the skills as per their competencies. Hence, all the three attributes – knowledge, skills, and attitudes – are assessed as required for the competency.

Several new methods and tools are now readily accessible, the use of which requires special training. Some of these are given below:

- Objective Structured Clinical Examination (OSCE), Objective Structured Practical Examination (OSPE), Objective Structured Long Examination Record (OSLER)
- Mini Case Evaluation Exercise (CEX)
- Case-based discussion (CBD)
- Direct observation of procedures (DOPs)
- Portfolio
- Multi-source feedback
- Patient satisfaction questionnaire

An objective structured clinical examination (OSCE) is used these days in several allied and healthcare courses, e.g. Optometry, Physiotherapy, and Radiography. It tests the performance and competence in communication, clinical examination, and medical procedures/prescriptions. In physiotherapy, orthotics, and occupational therapy, it tests exercise prescription, joint mobilization/manipulation techniques; and in radiography it tests radiographic positioning, radiographic image evaluation, and interpretation of results. The basic essential elements consist of functional analysis of the occupational roles, translation of these roles (―competencies‖) into outcomes, and assessment of trainees' progress in these outcomes based on demonstrated performance. Progress is defined solely by the competencies achieved and not the underlying processes or time served in formal educational settings. Most methods use predetermined, agreed assessment criteria (such as observation checklists or rating scales for scoring) to emphasize on frequent assessment of learning outcomes. Hence, it is imperative for teachers to be aware of these developments and they should suitably adopt them in the allied and healthcare education system.[xxi]



CHAPTER 2

Methodology of Curriculum Development for Physician Associates

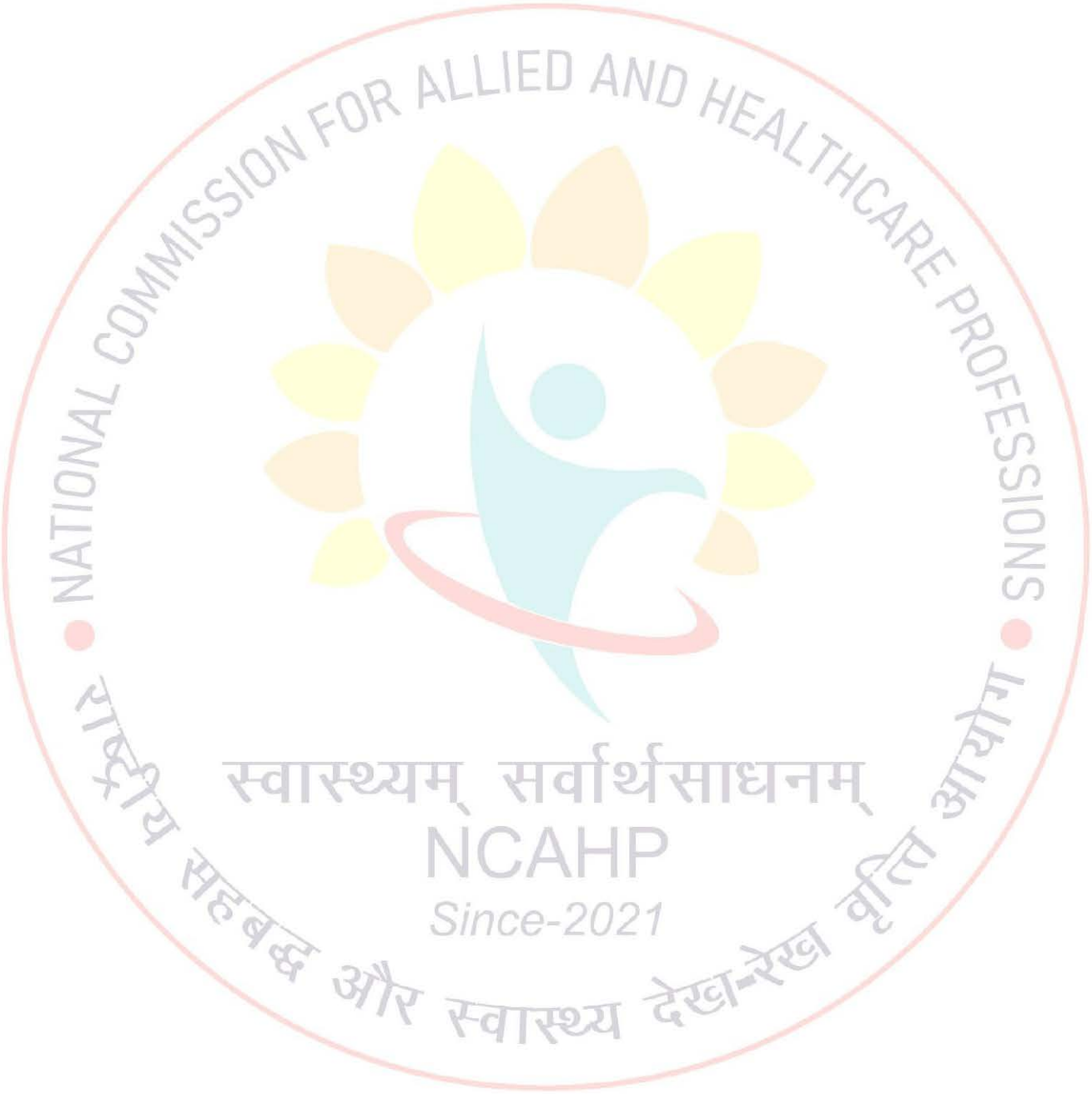
2.0 Methodology of Curriculum Development for Physician Associates

Steps undertaken in the curricula review process

The taskforce for Physician Associates (PAs) drafted the curriculum handbook in 2015-16. The Ministry of Health & Family Welfare (MoH & FW) established this taskforce as one of twelve working groups. Academicians and professionals from across India made up the team, and they developed the curriculum based on the standardized framework created by the National Initiative for Allied Health Sciences Technical Support Unit (NIAHS TSU), which provided technical support for the project. The team consulted various stakeholders, including senior industry experts and international authorities (see Acknowledgments section), before drafting the handbook. The National Curriculum Review Committee, which the MoH & FW also appointed, reviewed and approved the draft.

In 2021, after Parliament passed the National Allied and Healthcare Professions Act, the National Commission for Allied and Healthcare Professions formed a new taskforce to review the 2015-16 curriculum. The new taskforce included senior PAs and academic experts who aimed to refine and update the curriculum to address current needs. The taskforce held an initial online meeting on December 12, 2024, followed by 16 additional online sessions and numerous WhatsApp discussions. The team also consulted industry experts and senior PA faculty and, under the National Commission's guidance, finalized the updated curriculum handbook for 2024-25.

The review process addressed several critical issues in PA programs, including concerns about nomenclature, limited practical exposure, the rapid expansion of institutions, and the lack of standardized educational practices. The taskforce reached a consensus before finalizing the revised draft.



CHAPTER 3

Background of the Profession

3.0 Background of the Profession

3.1 Statement of Philosophy– Why this profession holds so much importance

For centuries, Physician Assistants (PAs), or PA analogs, have played a key role in increasing access to healthcare globally.[xx] A 2015 study revealed that PAs and their analogs exist in 46 countries, spanning both developing and developed nations.[xxi] In these countries, many roles traditionally performed by physicians have been taken over by PAs, significantly alleviating the workload of physicians and allowing them to focus on more specialized and complex tasks.[xxii]

Physician Assistants are trained in a medical model aimed at achieving specific healthcare outcomes. While the core training model is consistent, it is adapted to be cost-effective and regionally specific, ensuring that PAs are equipped to address the unique healthcare needs of each country.[xxi] This model has become the backbone of primary care in many countries, where PAs play a critical role in delivering efficient, accessible healthcare.[xxii]

As India faces increasing maldistribution and shortages of physicians, particularly in rural areas and urban slums, the PA model provides a promising solution to expand access to healthcare. By integrating PAs into healthcare teams, India can work towards its goal of achieving Universal Health Coverage (UHC) by 2030. This approach will improve community health, enhance the reach of public health services, and contribute to the economic vitality of underserved regions.

About the PA Profession

The PA profession originated in the 1960s in the U.S.A to address a growing shortage of healthcare providers. Today, there are more than 140,900 PAs practicing in the United States.[xxiii] Most PA programs are at the master's level, and PAs must pass the Physician Assistant National Certifying Exam (PANCE) to become board-certified. Physician Assistants work under physician supervision and have prescribing authority in all 50 states.[xxiv] They are employed across various medical specialties, including rural healthcare settings, where they have been successful in providing high levels of patient care and satisfaction.

The number of PA profession across the globe is growing, with 80 countries adopting 33 different titles, such as Physician Associates (U.K), Physician Assistants (U.S.A, Netherlands, Germany), Clinical Officers (Kenya), Medical Officers (Uganda), and Clinical Associates (South Africa). These diverse titles reflect the profession's evolution to meet the unique healthcare system requirements of each country.

The History of the PA Profession in India

In India, the PA cadre was introduced in 1992 to address the shortage of healthcare workers, particularly in fields like cardiology and cardiothoracic surgery.[xxv] Initially, PAs were trained through a two-year postgraduate diploma program in private tertiary care settings. Early on, training was highly specialized, which allowed PAs to become valuable members of the hospital team. Over the years, however, PA training has evolved to include broader, more generalist aspects of medical care.

Today, more than 130 institutions in India offer PA programs, affiliated with around 25 universities, both public and private. An estimated 10,000 PAs are currently practicing in India, predominantly in private healthcare institutions and tertiary care centers.[xxvi] PAs contribute to various specialties, including cardiology, nephrology, oncology, neurosurgery, and obstetrics, among others.

3.2 Scope of Practice

India faces an urgent need for greater primary healthcare access, especially in rural and underserved areas. The PA model is well-suited to meet this challenge. With a foundation in generalist training, PAs are equipped to provide preventive, diagnostic, and therapeutic services across multiple levels of the healthcare system, particularly in community health settings. Their versatility and ability to collaborate within multidisciplinary teams make them an invaluable resource in improving healthcare delivery.

In rural areas where physician shortages are most acute, PAs can serve as primary care providers, working alongside senior physicians to ensure continuity of care. One of the foundational elements of the PA profession is the physician-PA relationship. The profession was built on the principle of team-based care, with PAs working alongside physicians, complementing their expertise, and ensuring patients receive comprehensive care. Within this collaborative model, PAs have autonomy in making medical decisions, but always under the supervision of a physician. This allows them to manage less complex cases, which in turn allows physicians to focus on more specialized care. Physician Assistants may also be given restrictive prescriptive rights under the supervision of the physicians with whom they work, enhancing their ability to contribute to patient care.

Furthermore, specialty-trained PAs (with a master's degree or equivalent) will strengthen the healthcare system by taking on more complex roles within hospitals and outpatient settings, again under the supervision of physicians. This collaborative approach ensures that both PAs and physicians can work to the full extent of their training and expertise.

With the development of standardized national training, it will be necessary to establish accreditation for training sites, regulation of practice, and state-level licensure for PAs.

In rural areas, Primary Health Centers (PHCs) could employ multiple PAs to manage community health, with senior PAs overseeing healthcare teams at sub-center levels. Physicians at PHCs can focus on more complex cases and provide advanced care, while also supervising PAs and ensuring community health needs are met.

3.3 Recognition of Title and Qualification

The recommended title for these professionals is ‗Physician Associate', which reflects the standardized training and the broad scope of their role. This new title differentiates the profession in India from the earlier designation of ‗Physician Assistant,' aligning it more closely with their roles, international norms and standards.

As the profession evolves, the nomenclature and career pathways for PAs will continue to evolve based on sector demands and professional profiles. Given the National Skills Qualification Framework (NSQF), the progression of titles and career advancement will be further detailed through a career pathway table (Government of India, 2020). This will ensure clarity in qualifications, sector-specific roles, and progression within the healthcare system.

The table 2 below indicates the channel of career progression in two major sectors - clinical setting as well as academic route, where the professionals have indicated their presence and contribution to the system. It is envisaged that the PA will have only one entry pathway, i.e. students with Baccalaureate in this program may practice in the profession. The level of responsibility will increase as the career progresses and will start with level five (5) for the baccalaureate holders. The table also indicates the corresponding level of qualification with experience required by the professionals to fulfil the requirements of each level

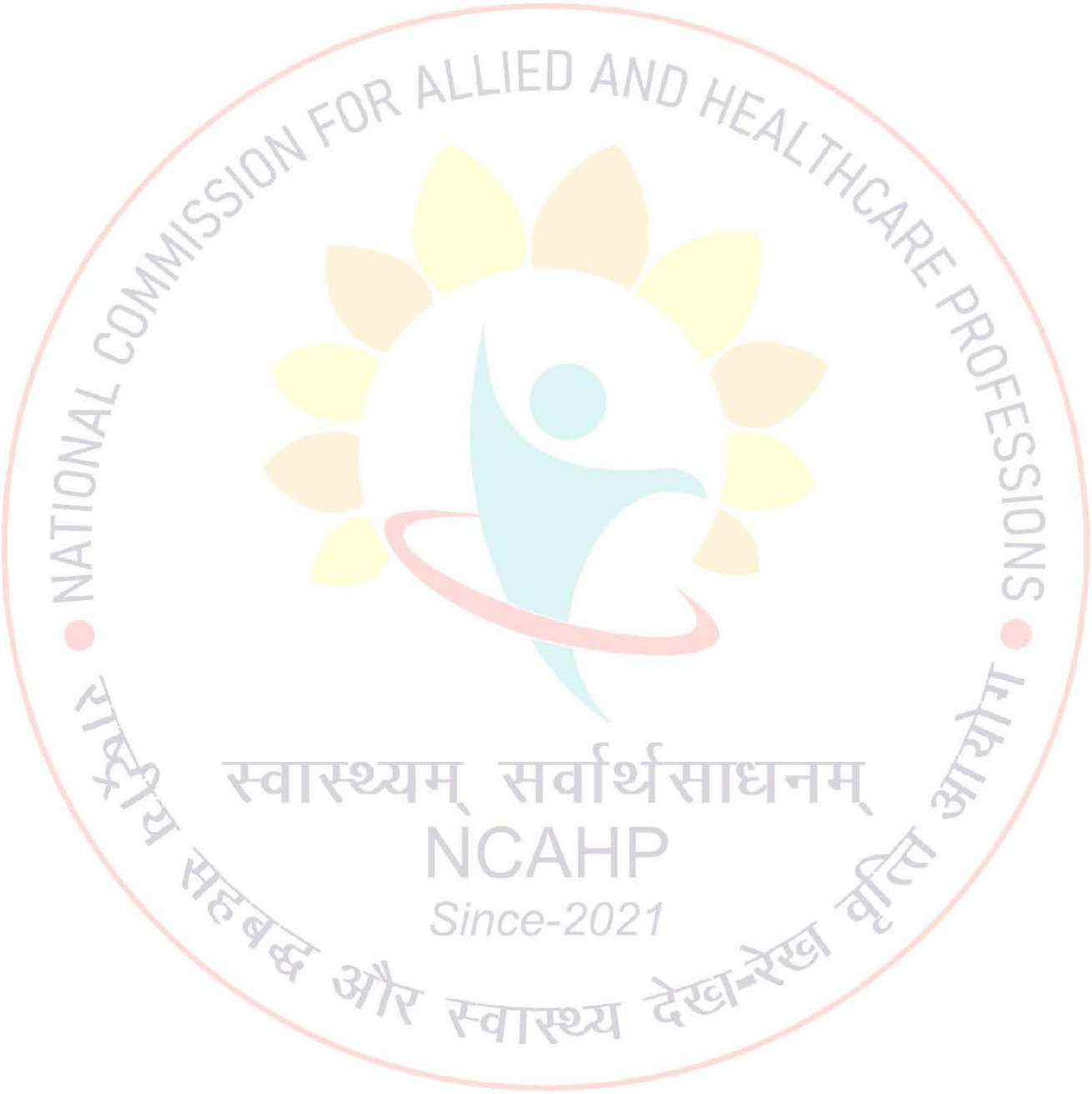
Table 1 Nomenclature based on career progression for Physician Associates

Nomenclature in Clinical sector	Qualification & experience	Nomenclature in Academic sector	Qualification & experience*
Junior Physician Associate	0–5-year experience post BPA	Teaching assistant	0–3-year experience post BPA
Senior Physician Associate	5–8-year experience post BPA **or,** 0–3-year experience post MPA	Tutor	3–5-year experience post BPA Post MPA 0-1-year experience
Senior Physician Associate Grade IV	BPA with 8–12-year experience post B.S **or** 3–5-year experience post MPA	Lecturer	1–3-year experience post MPA
Senior Physician Associate Grade III	12–16-year experience post BPA **or,** 5-10-year experience post MPA	Assistant Professor	MPA with 3–4-year experience post MPA
Senior Physician Associate Grade II	16–20-year experience post BPA **or,** 10-15 years MPA **or,** 3-year experience post PhD	Associate Professor	MPA with 4–6-year experience post MPA PhD with 1-3 year experience post PhD
Senior Physician Associate Grade I	>20 years post BPA/ >15 years MPA **or,** Ph.D. with >5years' experience post PhD	Professor and HOD/Programme Director/Principal	MPA > 6 years post MPA PhD > 4 years post PhD

3.5 Definition of Physician Associate

"Physician Associates are healthcare professionals trained in a medical model who practice medicine as part of a healthcare team. They are qualified and competent to provide preventive, diagnostic, and therapeutic services under the supervision of a physician."

Physician Associate also means, a person having Graduate degree in physician associate program obtained after the completion of a full- time course of 4 years (baccalaureate) which includes supervised clinical training from any medical university recognized by the University Grants Commission established under the University Grants Commission Act 1956.



CHAPTER 4

Education of the Physician Associate

4.0 **Education of the Physician Associate**

4.1 **Program structure**

The program is designed to be outcome based, meeting local and national human resource requirements, personal satisfaction and career potential for the professionals with supporting pathway in the development of the profession.

The following curriculum aims to focus on skills and competencies-based approach for learning. The curriculum is prescriptive and is designed with an aim to standardize the content across the nation. The focus of the profession is to create qualified and skill healthcare workforce in the field of Physician Associates through the following levels of higher education –

1. Bachelor of Physician Associate studies (BPA)
2. Master of Physician Associate studies (MPA)
3. Doctor of Philosophy (PhD)

4. 2. Entry requirements

It is recommended that the students entering the BPA program have:

1. Passed the Higher Secondary (10+2) or equivalent examination recognized by any Indian University or a duly constituted Board with at least 50% marks in Physics, Chemistry and Biology (in each of the subjects).
2. Candidates who have studied abroad and have passed the equivalent qualification as determined by the Association of Indian Universities will form the guideline to determine the eligibility and must have passed with at least 50% marks in each of the following subjects: Physics, Chemistry, Biology and English up to 12thStandard level.
3. Candidates who have passed the Senior Secondary school Examination of National Open School with a minimum of 5 subjects with any of the following group subjects.
    a. English, Physics, Chemistry, Botany, Zoology
    b. English, Physics, Chemistry, Biology and any other language
4. He/she has attained the age of 17 years as on - (current year) & maximum age limit is 40 years
5. He/she must furnish at the time of submission of application form, a certificate of Physical fitness from a registered medical practitioner and conduct certificate from the educational institution last attended or any recognized person (s) as applicable by the University Rules testifying to satisfactory general character.

6. The initial PA programs will admit traditional students. Future expansion may consider bridge programs and lateral career transitions for second-career health professionals (e.g., Nurses, AHPs), but at present, no lateral entry is allowed.

Apart from the eligibility criteria, a common entrance test will be conducted (preferably at the national level), or any other method permissible by law. Admission to the BPA program will be based on cut off marks as in medical entrance examination. Candidates who qualify the eligibility criteria will only be permitted to write the common entrance test. Candidates will be tested on the following subjects: Physics, Chemistry, Biology and English Language.

4.3 Course Duration

It is recommended that any program developed from this curriculum adhere to the following duration to qualify as a traditional professional course in Physician Associate education:

4.4. Bachelor of PA studies-Undergraduate Degree

The 4-year undergraduate program should provide a strong theoretical foundation in both pre- clinical and clinical subjects over the first three years, integrated with practical exposure in laboratories and clinical settings.

- Community Engagement: From the first year, students should engage in community- based learning, progressively increasing clinical interactions. This will help learners understand the concept of _health‘ as a whole, beyond just the _medicine‘ aspect of care. The goal is to foster a sense of social responsibility and awareness of diverse community needs.
- Primary Healthcare Focus: The program aims to develop the PA as a key member of the primary healthcare team, capable of performing appropriate patient assessment, planning, and delivery of primary healthcare services.
- Final Year Internship: In the final year, students will complete a 12 month clinical placement to reinforce the knowledge and skills gained during the earlier years of study.

4.4. Master of PA studies-Post Graduate Degree

Given the evolving healthcare landscape and the increasing demand for healthcare services, it is crucial to establish well-structured postgraduate programs that expand the PA's scope in advanced clinical care and contribute to research in the field.

A Master‘s degree program is recommended, with a minimum of two years of education following the completion of a Bachelor‘s degree. This advanced training will deepen the PA‘s clinical knowledge, enhance their ability to contribute to research, and improve their academic growth.

4.6 Specialization

A post-master‘s diploma or fellowship may be introduced for those who wish to specialize in specific areas of medicine or surgery.

4.7 Doctoral Degree (PhD)

The role of a PhD in the academic structure is significant; however, the curriculum does not provide specific prescriptive guidelines at this level, apart from its positioning on the career and qualification map.

- PhD programs are expected to contribute to the nurturing of academic staff for teaching roles in Bachelor‘s and Master level PA programs.
- Clinical PhD: Both Clinical PhDs and PhDs by research are recommended to advance the field. These will be further deliberated upon as part of the broader academic strategy for PA development.

4.8 Exit exam / Licensure exam

A third-party exit/licensure exam will be conducted at the end of the third year of the Bachelor‘s program**.** This exam serves as a mandatory assessment for eligibility to enter clinical practice**.**

- The university will issue a degree completion certificate only after the student has completed the full four years of education, including the internship.
- Both completion of the degree and clearing the exit exam are required for a PA to begin clinical practice.

Additional criteria and regulations for the exit exam will follow the guidelines set by the National Commission for Academic and Health Professions (NCAHP)**.**

4.9 Teaching faculty and infrastructure

Providing an adequate learning environment for students is essential. Both physical infrastructure and teaching staff must be sufficient to support effective learning.

4.9.1 Teaching Spaces: Teaching areas should accommodate a variety of instructional methods. Large lecture theatres may be suitable for didactic lectures shared with other disciplines, while smaller spaces should be available for tutorials and problem- or case-based learning.

4.9.2 Health and Safety: All student placements, whether in classroom or clinical settings, must comply with health and safety standards.

It is also crucial to provide resources that support students‘ academic, social, cultural, and socioeconomic diversity. A supportive and persistent environment is key to the development of a skilled healthcare workforce.

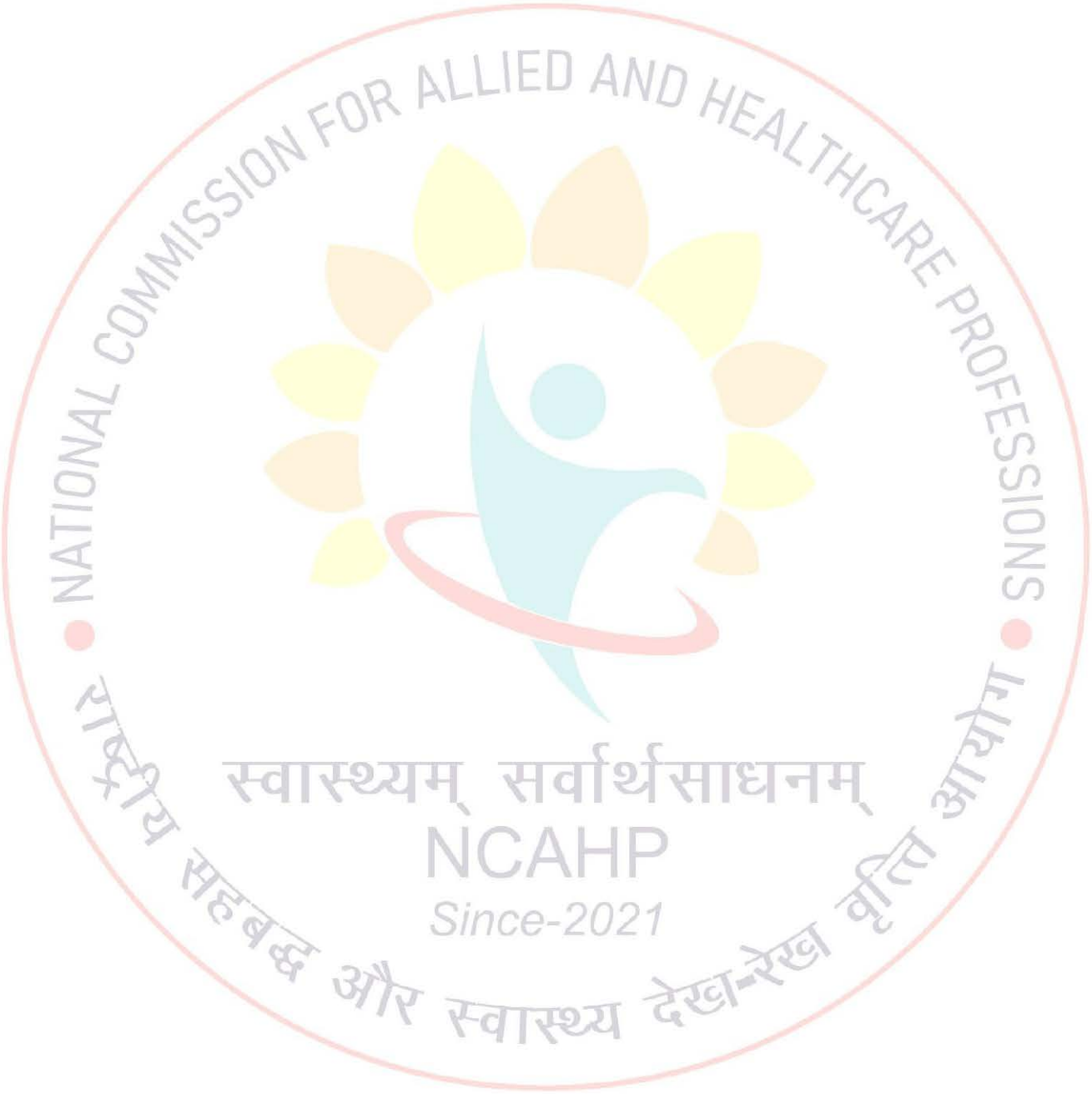
4.9.3 Faculty Qualifications: In alignment with the medical model of the curriculum, only Pas with a Master‘s degree and physicians (MD/MS) should be responsible for teaching clinical subjects and supervising clinical rotations. Healthcare institutions offering PA programs should make it mandatory for Pas and physicians to 38ulfill dual responsibilities—clinical work and academics—at the time of recruitment. Additionally, these institutions should ensure adequate time allocation and financial compensation for both roles.

4.9.4 Diploma in Medical Education: All Pas and preferably even physicians who teach clinical subjects should have completed a diploma in medical education. Additionally, part- time clinical practice should be mandatory for teaching clinical subjects.

4.9.5 Experience Requirements: Graduate Pas who teach should have worked at least three years as a clinical PA and completed a diploma in medical education.
These recommendations are based on a series of focus group discussions held by Indian PA experts from the Indian Association of Physician Assistants (IAPA) and academicians with leaders from the International Academy of Physician Associate Educators (IAPAE) at the Annual conference of the both the professional bodies jointly held at Ahmedabad in 2023.

4.9.6 Clinical Sites: It is mandatory for all PA programs to have clinical settings that are relevant to the subjects taught. In cases where certain settings are not available, such as a training site lacking a neurology setup, arrangements should be made with external sites to ensure appropriate clinical exposure for students.

4.9.7 Financial Compensation: The current PA program is hindered by inadequate or non-existent financial compensation for PAs involved in academic roles. It is strongly recommended that teaching institutions provide appropriate time allocation and financial compensation for PAs engaged in teaching, including clinical preceptors. This compensation should be on par with clinical work, whether the preceptors are within the institution or at external clinical sites not affiliated with the training institute.



CHAPTER 5

Job Availability

5.0 Job Availability

The graduate-level PA course equips graduates with comprehensive knowledge in medicine, management, and research, providing job opportunities in diverse settings.

5.1 Job Opportunities

The job sectors for PAs can be divided into the following areas:

1. Primary Care and Community Medicine
2. Public Sector
3. Private Sector
4. Academic Sector
5. Scientific Research

5.1.1 Primary Care and Community Medicine

Physician Associates have many job opportunities in primary care and community medicine due to the high demand for healthcare services. They work with physicians in family medicine, internal medicine, or general practice to provide routine check-ups, preventive care, chronic disease management, patient education, and health screenings.

5.1.2 Public Sector

Physician Associates have numerous opportunities to work in the public sector, where they can contribute to enhancing public health, delivering care in underserved regions, and supporting government initiatives. Public sector positions are commonly found in government agencies, public health organizations, or non-profit organizations. These roles often involve community health, health policy, and service in disadvantaged or rural areas.

5.1.3 Private Sector

Physician Associates have a wide range of opportunities in the private sector, where they can work in various settings and specialties, often focusing on patient care in traditional healthcare environments. Currently, it is in the private healthcare sectors where they are in good demand.

5.1.4 Academic Sector

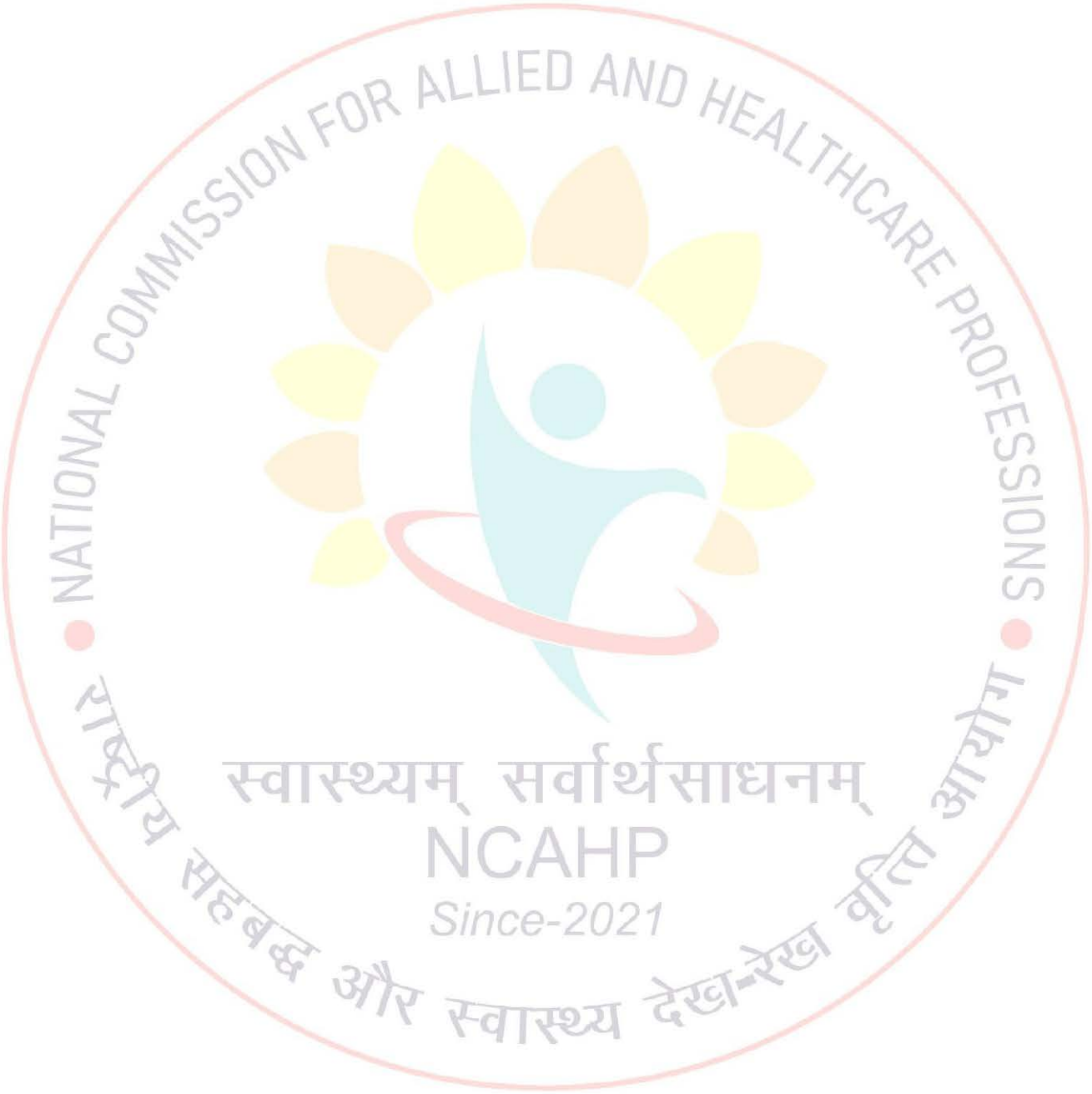
Physician Associates have a wide range of opportunities in the academic sector, where they can take on roles such as teaching, conducting research, and providing clinical training.

Working in academia allows PAs to influence the future generation of healthcare professionals, contribute to academic research, and collaborate with other professionals in educational environments. These roles can be found in universities, medical schools, PA programs, and research institutions.

5.1.5 Research

Physician Associates can work in research settings alongside physicians and other healthcare professionals to conduct studies, analyze data, and contribute to the development of new treatments and protocols. Their hands-on experience in patient care allows them to provide valuable insights and perspectives in research projects. Additionally, PAs can pursue advanced degrees or certifications in research methodology to further enhance their skills and knowledge in this field.

With the development of standardized training nationally, the PAs will require accreditation of training sites, regulation of practice, and management of state-level licensure. As clinicians trained in a medical model, they will need to have prescriptive rights that can be overseen by the physician they work with.



CHAPTER 6

Bachelor of Physician Associate Studies (BPA)

6.0 Bachelor of Physician Associate Studies (BPA)

Introduction

The PA programs worldwide follow the traditional medical education model, with clinical training integrated alongside didactic lectures.

The undergraduate curriculum is designed to educate PAs as generalists, focusing on efficient primary care. Initially, PAs work as dependent practitioners with physicians, but as they gain qualifications and experience, they take on increasing responsibilities and independent decision-making. In areas with a shortage of physicians, experienced PAs may work with minimal onsite supervision, through remote support delivered through phone, computer, or telemedicine ensuring PAs are never without assistance.

Physician Associate training provides a strong foundation in basic, behavioural, and clinical sciences, along with ancillary subjects (e.g., computer education, clinical research). For PAs who work closely with patients, a patient-centric approach in clinical practice is essential. A patient-centric approach to teaching for PAs emphasizes the patient as the central focus of healthcare delivery. This teaching methodology prioritizes developing students‘ skills in patient-centered care, which involves understanding, respecting, and responding to patients' preferences, needs, and values throughout the course of care. The introduction of subjects such as professionalism, ethics, and communication etc., along with clinical subjects, supports this approach.

The National Curriculum Taskforce on PAs has developed a career and qualification map based on the National Skills Qualification Framework (NSQF). This framework outlines a career pathway, with level 5 as the entry point after completing a 4-year Bachelor of Physician Associate studies program (BPA).

Foundation courses has also been designed to bring all potential healthcare professionals at the same level of understanding with respect to basic healthcare related norms before the start of a career in a healthcare professional course. The foundation courses that has been prescribed for all the allied and healthcare professional courses have been modified in this document to suit the PA educational needs.

6.1 Scope of the BPA Program

Upon completing the PA program, graduates will be qualified to work as PAs across a wide range of healthcare settings. They will assist physicians and surgeons in diagnosing, treating, and managing patient care in various specialties, including primary care, emergency medicine, surgery, pediatrics**,** and more.
Graduates will be trained to:

- Conduct thorough patient assessments
- Order and interpret diagnostic tests
- Prescribe medications and perform medical procedures under supervision
- Provide support in clinical settings, improving efficiency and patient outcomes.

Additionally, PA graduates can contribute to clinical research, public health initiatives**,** and healthcare policy. The program also offers opportunities for specialization in specific fields, with pathways for career advancement in academics, research**,** and clinical medicine**. (Refer Chapter5).**

6.2 Learning Objectives of the BPA program

- Able to engage in providing primary care, specialty care through the elicitation of an appropriate history, physical exam, understanding when/what to order in regard to further testing, following a process of differential diagnosis and clinical decision making, determining a diagnosis and treatment plan, as well as preventative measures under the scope of the attending physician
- Able to recognize and appropriately engage support/referral from physician and healthcare team when the patient‘s health care needs are greater than the PA‘s ability
- Able to understand their professional role in the healthcare team, and interact in a collegial interdisciplinary manner with a focus on maximizing the care for the patients
- Able to understand how the social determinants of health impact the patient and incorporate them into care plan
- Able to engage advocacy as well as social accountability activities as they relate to patient care.

6.3 Eligibility for admission

Refer section 4.2

6.4. Selection procedure

As described in 4.2

6.5 Duration of the program

4-year programme (3 years-didactic + 1 year internship)

6.6. Academic calendar and mode of education

On-campus, semester patter, full time.

6.7 Coaching pattern

Five days a week-on all working days: theory, lab and clinical rotations.

One day in a week (excluding 5 days of didactic coaching): Group discussion, presentations, seminars, guest lecturers+ library hours. This, the students will preferably do on Saturdays or any other fixed day of the week (as suitable by the training institution). Classroom lectures will not occur on this day.

6.8 Medium of instruction

English shall be the medium of instruction for all the subjects of study and for examination of the course.

6.9 Attendance

A candidate must secure minimum 80% attendance in overall with at least

1. 75% attendance in theoretical
2. 80% in Skills training (practical) for qualifying to appear for the final examination.

No relaxation, whatsoever, will be permissible to this rule under any ground including indisposition etc.

6.10 Teaching and learning methods for BPA

A variety of teaching methods will be employed, including lectures, seminars, small group discussions, laboratory and bedside demonstrations, hands-on clinical practice or simulations/mannequins, educational videos, and online tutorials. Emphasis will be placed on laboratory/bedside clinical training, group discussions, and presentations. Classroom lectures will provide foundational knowledge, supporting the practical skills learned during lab and clinical training.

Community-based engagement and outreach, along with preparatory and reflective exercises throughout the program, will deepen students' understanding of their roles as healthcare providers. All students are required to maintain a lab diary and log book, where applicable, which will be evaluated and supervised by lab instructors and clinical preceptors periodically.

6.11 Performance assessment of students

Students will be continuously assessed during their clinical rotations, with periodic evaluations of their lab diaries and logbooks (Internal assessment). The OSCE method of evaluation will be used to assess clinical skills by external faculty.

A university level written examination will be conducted at the end of each semester. The OSCE method of evaluation will be used to assess clinical skills by external faculty.

6.12 Vacation and holidays

Students are entitled to ten days of festival and national holidays, 15 days of semester-end holidays (after each semester), and any additional holidays (including study leave) as determined by the teaching institute.

6.13 Competencies of BPA graduates

- **Medical Knowledge:**
    - Acquire foundational knowledge in biomedical and clinical sciences, including understanding pathophysiology, diagnosis, treatment, and prevention.
    - Use scientific principles to distinguish between normal and abnormal findings, interpret diagnostic data, and manage medical and surgical conditions.

- **Interpersonal & Communication Skills:**
    - Communicate clearly with patients, families, and healthcare teams, using verbal, nonverbal, and written methods.
    - Present patient cases, collaborate with physicians, and maintain professional relationships with patients and team members.

- **Patient Care:**
  - Collect accurate patient histories, conduct physical exams, and develop evidence-based treatment plans.
  - Show proficiency in clinical skills, patient-focused care, and health promotion practices.

- **Professionalism:**
  - Practice ethically, demonstrating respect, integrity, and accountability in patient care.
  - Commit to ongoing professional development, self-reflection, and adhere to legal and regulatory standards.

- **Practice-based Learning & Improvement:**
  - Continuously assess and analyze clinical practice to enhance patient care.
  - Use medical literature and technology to support lifelong learning and evidence-based practices.

- **Systems-based Practice:**
  - Navigate healthcare systems effectively, ensuring care that balances quality with cost.
  - Work with healthcare teams to enhance patient outcomes and address healthcare disparities.

6.14 Curriculum overview (BPA)

Credit point is awarded for every 30 hours of practical work and 1 credit point for every 15 hours of theory.

First Semester

		Hours		
Code	**Subjects**	**Theory**	**Practical**	**Total**
01	Professionalism	20	10	30
02	Anatomy-I	50	50	100
03	Physiology-I	50	60	110
04	Biochemistry and Molecular Biology-I	40	50	90
05	Introduction to Microbiology	40	50	90
06	Introduction to Healthcare Delivery System in India	30	30	60
07	Functional English and soft skills	20	40	60
08	Community Orientation-I	20	10	30
	Total hours Total Credits: 28	270	300	570

Second Semester

		Hours		
Code	**Subjects**	**Theory**	**Practical**	**Total**
09	Professionalism	10	10	20
10	Anatomy II	50	70	120
11	Physiology II	50	70	120
12	Biochemistry and Molecular Biology-II	50	30	80
13	Medical Microbiology	60	40	100
14	Introduction to computers	30	50	80
15	Community orientation -II / Clinical skills	20	30	50
	Total hours Total Credits: 28	270	300	570

Third Semester

		Hours		
Code	**Subjects**	**Theory**	**Practical**	**Total**
16	Pathology	50	60	110
17	General Medicine-I	50	60	110
18	Pharmacology and toxicology-I	50	30	80
19	ENT, Ophthalmology & Dermatology	50	80	130
20	Basics of Surgery	50	40	90
21	Community Orientation / Engagement	20	30	50
	Total hours Total Credits: 28	270	300	570

Fourth Semester

		Hours		
Code	**Subjects**	**Theory**	**Practical**	**Total**
22	General Medicine-II	50	60	110
23	Advanced Surgery	70	60	130
24	Pharmacology & Toxicology-II	40	40	70
25	Psychology & Introduction to Behavioral Medicine	40	50	80
26	Medical Communication	30	40	70
27	Community Medicine and Clinical Research - I	40	50	80
	Total Hours Total Credits: 28	270	300	570

Fifth Semester

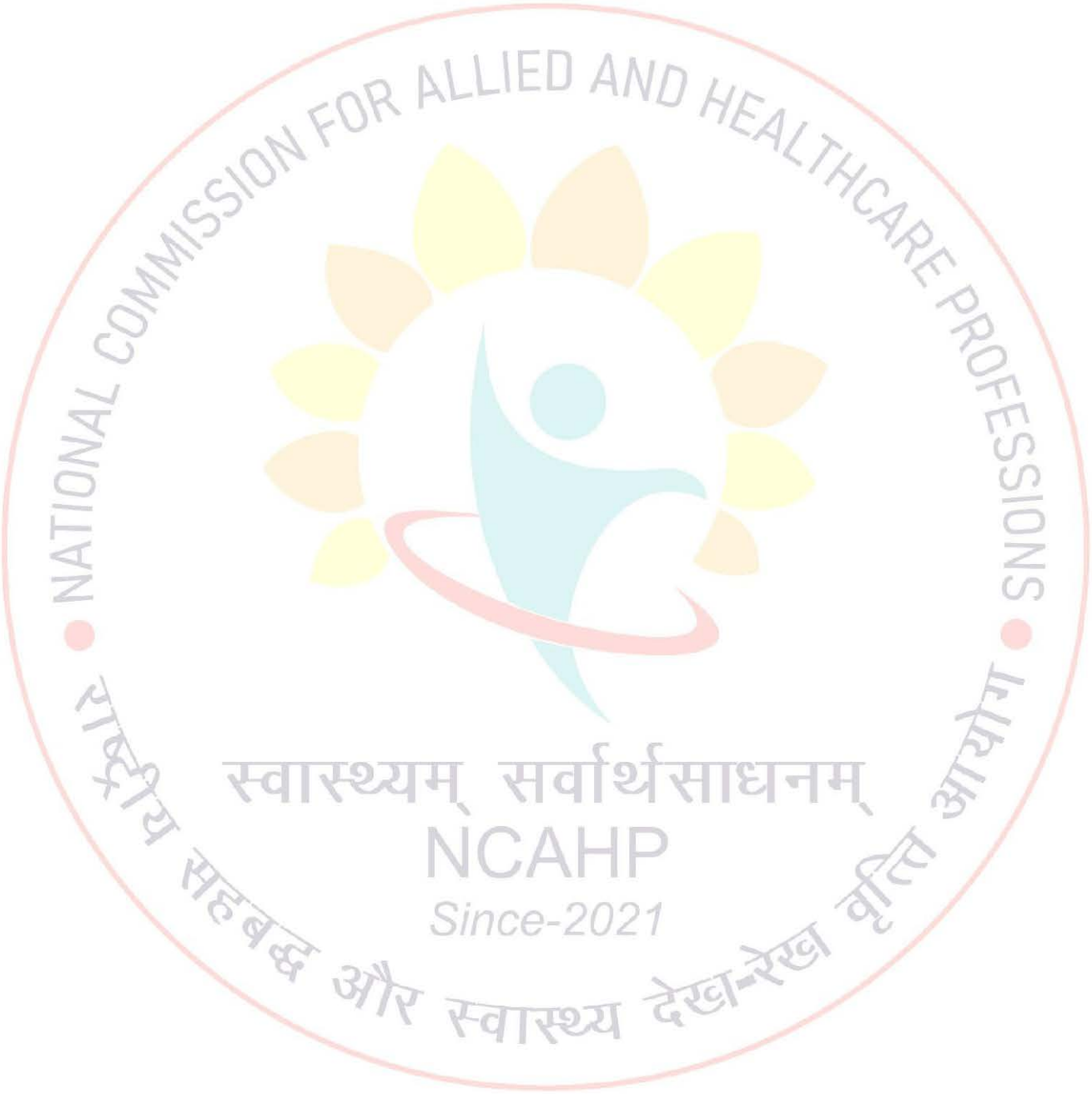
		Hours		
Code	**Subjects**	**Theory**	**Practical**	**Total**
28	Emergency Medicine	80	80	160
29	Paediatrics	70	80	140
30	Introduction to healthcare management	30	40	45
31	Medical Ethics and Law	40	40	35
32	Introduction to healthcare management	50	60	50
	Total Hours **Total Credits: 28**	270	300	570

Sixth Semester

		Hours		
Code	**Subjects**	**Theory**	**Practical**	**Total**
33	Non-Communicable Diseases	70	80	150
34	Geriatrics	60	70	150
35	Obstetrics and Gynaecology	70	80	150
36	Critical care	30	30	60
37	Community Medicine and Clinical Research-III	40	40	60
	Total Hours Total Credits: 28	270	300	570

Semesters VII and VIII-Clinical Year/Internship

Students will be posted six months in general medicine with a focus in primary care and six months in surgery-3 months in general surgery and 3 months in any specialty medicine of their choice (medical or surgical). The thesis worked over the preceding semesters will be completed and submitted by the interns at the end of Semester VI and subjected to scrutiny. Successful completion of the thesis to the satisfaction of the reviewers forms an essential part of the PA programme. Five days a week will be devoted to clinical training and one day would be dedicated to activities for academic advancements. The interns should be provided adequate living expenses as stipend during the internship period. If the teaching institute does not have adequate clinical facilities, they should arrange for an internship in an external site. It is the teaching institute's responsibility to provide stipend, and arrange for mentors at the external site. An intern should not do clinical work for more than 10 hours in a day. In case if the duty hours overshoots, the intern should be financially compensated for the overtime.



CHAPTER 7

BPA Syllabus

CHAPTER 7

7.0 BPA Syllabus YEAR-I-SEMESTER I

BPA 01. PROFESSIONALISM

Goal:

This course will present what it means to be a professional and how a specialized profession is different from a usual vocation. It explains how relevant professionalism is in terms of healthcare systems and how it affects the overall environment. This course will also bring forward the importance of professional identity of the Physician Associate in India.

Total Lecture Hours: 20 Theory

Professional values –Integrity, Objectivity, Empathy, Professional competence and due care, Confidentiality Personal values-ethical and moral values

Attitude and behaviour – professional behaviour, bias's, treating all patients equally Code of conduct, professional accountability, responsibility and misconduct Differences between professions and importance of teamwork

Cultural issues in the healthcare environment

Practical – 10 hours

Group scenarios with role play to reinforce knowledge gained through theoretical lectures

BPA 02. ANATOMY – I

Goal:

This course is designed to provide foundational knowledge and skills in human anatomy, anatomical terminology, regional anatomy, and developmental embryology. Students will gain a comprehensive understanding of the structure and function of the human body, regional anatomy, and anatomical landmarks. The course also emphasizes the clinical relevance of anatomy, helping students to relate their anatomical knowledge to clinical scenarios and medical procedures.

Teaching methods and settings

The combination of interactive lectures, practical dissection, prosection, imaging, virtual reality, and hands-on clinical skills
The settings would include traditional lecture halls, anatomy labs, simulation centers, and relevant clinical settings.

Learning Objectives

By the end of the course, students will be able to:

- Understand the definition, scope, and different approaches to the study of anatomy (gross, regional, systemic, microscopic).
- Master standard anatomical terminology, planes, axes, positions, and major anatomical landmarks.
- Study the basic principles of developmental embryology and its clinical relevance.
- Relate anatomical knowledge to clinical conditions and procedures (e.g., venipuncture, catheterization, lumbar puncture).
- Interpret basic imaging techniques (X-ray, CT, MRI) to study anatomical structures and common pathologies.

Pre-requisites

Basic knowledge in biology, chemistry, and physiology.

Theory (50 hours)

Topic	Content
1. Introduction to Anatomy (5 hours)	- Description of Anatomy: Approaches to studying anatomy (gross, regional, systemic, microscopic, cross-sectional, functional, applied). - Microscopic Anatomy – integrated with molecular biology.
2. Overview of Developmental Embryology (5 hours)	- Basic principles of human development from fertilization to fetal stages. - Clinical relevance of embryological development and congenital anomalies.
3. Foundations of Gross Anatomy (5 hours)	- Anatomical Nomenclature: Standard anatomical terms, directional terms, regions, and anatomical landmarks. - Planes and Axes: Introduction to body planes (sagittal, coronal, transverse) and axes (vertical, horizontal, etc.). - Body Regions: Identification of anatomical regions and clinical significance. - Body Systems: Overview, with detailed coverage in Anatomy II.
4. Regional Anatomy (30 hours)	*In-depth study of each body region with a focus on muscles, bones, nerves, blood vessels, and clinical relevance. Imaging techniques (e.g., X-rays, CT, MRI) and cross-sectional anatomy should be integrated where applicable.* - **4.1 Head and Neck Anatomy (5 hours)**: Cranial cavity, facial bones, muscles, cranial nerves, blood supply, clinical conditions. - **4.2 Thoracic Anatomy (5 hours)**: Thoracic wall, pleurae, lungs, heart, mediastinal structures, clinical relevance. - **4.3 Abdominal Anatomy (5 hours)**: Abdominal wall muscles, organs, blood supply, clinical relevance. - **4.4 Pelvic Anatomy (5 hours)**: Pelvic girdle, floor, organs, neurovascular structures, clinical relevance. - **4.5 Upper Limb Anatomy (5 hours)**: Bone groups, muscles, joints, vasculature, clinical relevance. - **4.6 Lower Limb Anatomy (5 hours)**: Thigh, knee, leg, ankle, foot, clinical relevance.
5. Introduction to Clinical Procedures (5 hours)	- Anatomical locations for procedures: blood sampling, catheterization, intubation, lumbar puncture, suturing, CPR.
6. Histology (5 hours)	- Identification of tissue types and microscopic anatomy integration.

Teaching methods/tools

Practical sessions will include cadaver dissection, prosections, anatomical models, charts, X-rays, CT, MRI, angiograms, and histology slides.

Practical (50 hours)

Topic	Content
1. Orientation to Anatomy Labs	- Become familiar with tools and equipment handling, anatomical positions, and directional terms.
2. Histology	- Microscopic examination of tissue types.
3. Regional Anatomy Dissection (8 hours each)	- **3.1 Upper Limb**: Dissection of scapula, shoulder joint, arm, forearm, and hand. Identification of muscles, tendons, arteries, veins, and nerves. - **3.2 Thoracic Anatomy**: Dissection of chest wall, pleurae, lungs, heart, and mediastinal structures. - **3.3 Abdominal Anatomy**: Study of abdominal wall muscles, organs, and blood supply. - **3.4 Pelvic Anatomy**: Dissection of pelvic girdle, pelvic floor, pelvic organs, and neurovascular structures. - **3.5 Head and Neck**: Identification of cranial nerves, muscles, and blood vessels. Study of skull bones, oral and nasal cavities, and lymph nodes. - **3.6 Lower Limb**: Study of bones, muscles, joints, tendons, and neurovascular structures in the lower limb.
4. Clinical Skills Practice	- Identify major anatomical landmarks and locate sites for venipuncture and arterial puncture. - Observe and relate procedures to anatomy studied (e.g., endotracheal intubation, lumbar puncture, central venous catheterization).
5. CPR and Defibrillation Landmarks	- Practice on models.
6. Study of Histology Slides	- Tissue structure identification.
7. Microanatomy	- To be explored in molecular biology.

PHYSIOLOGY

Physiology (I and II) will be taught through a combination of lectures**,** practical labs**,** rotations in clinical settings, simulations etc.**,** These methodologies aim to give students a deep understanding of physiological principles and how they apply to human health and disease. The practical component of these courses allows students to directly engage with physiological processes, and the clinical integration ensures they can apply their knowledge to real-world patient care scenarios.

BPA 03. PHYSIOLOGY-I

Goal:

The aim of the Physiology I course is to provide students with an in-depth understanding of the functions of the human body at the cellular, tissue, and organ system levels. Students will learn the physiological mechanisms that regulate homeostasis, understand the principles of human metabolic processes, and be able to apply this knowledge in clinical contexts.

Learning Objectives:

By the end of Physiology I, students should be able to:

- Understand the basic principles of physiology, including homeostasis and feedback mechanisms.
- Describe the cellular basis of physiology, including membrane transport and cellular signalling.
- Explain the structure and function of tissues and organs, focusing on cardiovascular, respiratory, digestive, and renal physiology.
- Identify the physiological mechanisms of fluid and electrolyte balance, and their importance in maintaining homeostasis.
- Understand the physiological regulation of temperature, acid-base balance, and blood pressure.
- Demonstrate the ability to integrate knowledge of physiological systems and their roles in maintaining health.

Pre-requisites:

Basic understanding of biology, chemistry, and biochemistry, which will be taught concurrently.

Theory (50 hours)

Topic	Content
1. Introduction to Physiology (5 hours)	- Definition and scope of physiology. - Overview of homeostasis and the role of feedback mechanisms. - Basic principles of cell physiology (membrane transport, action potentials). - Tissue types and their functions.
2. Cellular Physiology (10 hours)	- Structure and function of cells. - Transport across cell membranes (diffusion, osmosis, active transport). - Resting membrane potential, action potential, and their roles in cellular communication. - Signal transduction (hormonal, neuronal, and second messengers). - Cellular metabolism (glycolysis, Krebs cycle, oxidative phosphorylation).
3. Cardiovascular System (10 hours)	- Structure and function of the heart: - Cardiac cycle, electrical activity of the heart, and the conduction system. - Heart sounds, ECG, and blood pressure regulation. - Blood vessels and blood pressure regulation: - Vasomotor control, blood flow, and autoregulation. - Hemodynamics: Blood flow, resistance, and cardiac output.
4. Respiratory System (10 hours)	- Structure and function of the respiratory system. - Mechanism of breathing (inhalation, exhalation). - Pulmonary ventilation and lung mechanics. - Gas exchange and transport (O_2 and CO_2). - Control of respiration (central and peripheral chemoreceptors). - Acid-base balance and the role of the lungs.
5. Renal System (5 hours)	- Structure and function of the kidneys. - Glomerular filtration, tubular reabsorption, and secretion. - Regulation of water, sodium, and electrolyte balance. - Acid-base balance and renal regulation.

6. **Digestive System (5 hours)**	- Structure and function of the digestive organs. - Mechanism of digestion and absorption of nutrients. - Gastrointestinal motility and secretions. - Regulation of the digestive process (neural and hormonal control). - Liver function in metabolism.
7. **Endocrine System (5 hours)**	- Introduction to hormones and their functions. - Endocrine glands and their secretions. - Regulation of growth, metabolism, and reproduction. - Homeostatic control by hormones (insulin, glucagon, thyroid hormone, etc.).

Practical: (60 hours)

Study Methodology: The practical component will be based on laboratory experiments, demonstrations, and clinical skill workshops. Students will perform experiments, interpret physiological data, and integrate the theory learned in the classroom into real-world applications.

Topic	Content
1. Introduction to Laboratory Techniques (2 hours)	- Lab Safety. - Introduction to Equipment: Microscopes, Thermometers, Spirometers, Sphygmomanometer.
2. Cell Physiology and Membrane Transport (6 hours)	- **Osmosis Experiment**: Observe changes in volume over time using dialysis bags with different concentrations. - **Diffusion Experiment**: Study the diffusion of dye through agar plates. - **Active Transport Simulation**: Observe the active transport of ions using a model or virtual simulation.
3. Cardiovascular Physiology (12 hours)	- **Measuring Blood Pressure**: Use a sphygmomanometer to measure systolic and diastolic pressures and pulse rate. - **ECG Recording**: Record ECG, observe P-QRS-T waves, and analyze heart rhythms. - **Heart Rate Variability**: Measure heart rate at rest and after exercise to study autonomic nervous system influence. - **Blood Flow and Hemodynamics**: Measure blood pressure changes when moving from lying to standing.

4. Respiratory Physiology (10 hours)	- **Spirometry**: Measure tidal volume, inspiratory reserve volume, expiratory reserve volume, vital capacity, and FEV1. - **Effect of Breathing Patterns on Lung Volumes**: Measure changes in lung volumes after hyperventilation or deep breathing. - **Blood Gas Analysis**: Measure O_2 and CO_2 levels in arterial blood and interpret the data.
5. Renal Physiology (8 hours)	- **Measuring Urine Volume and Composition**: Measure volume, specific gravity, color, and pH of urine. - **Renal Clearance Experiments**: Perform a clearance test using inulin or creatinine to calculate renal clearance.
6. Digestive Physiology (6 hours)	- **Salivary Amylase Activity**: Measure the rate of starch breakdown by salivary amylase. - **Effect of pH on Digestive Enzyme Activity**: Test enzyme activity at different pH levels.
7. Endocrine Physiology (6 hours)	- **Glucose Tolerance Test**: Measure blood glucose levels after administering glucose solution. - **Thyroid Function Test**: Measure thyroid hormone levels and discuss their impact on metabolism.

BPA 04. BIOCHEMISTRY AND MOLECULAR BIOLOGY I

Teaching methods and settings: interactive lectures, case studies, and discussions of clinical scenarios using multimedia tools for illustrating biochemical pathways and molecular mechanisms. Practicals involve laboratory sessions involving direct interaction with biochemical assays, data analysis, and interpretation.

Goal:

To provide students with a comprehensive understanding of the molecular and biochemical foundations of human life processes, focusing on their relevance to clinical practice. The course will emphasize the application of biochemical principles in diagnosing and solving clinical problems, particularly those related to metabolic disorders and cellular functions.

Learning objectives

At the end of the course, students should be able to:

1. Describe the structure and function of cells, organelles, and biological membranes, and explain membrane transport mechanisms and ion channels in cellular processes.
2. Classify and explain the structure and function of biomolecules such as carbohydrates, lipids, proteins, and amino acids, and understand stereoisomerism in biomolecules.
3. Investigate the structure and function of hemoglobin and myoglobin, and understand the molecular mechanisms of oxygen transport, storage, and disorders like sickle cell anemia and thalassemia.
4. Understand the molecular mechanisms involved in muscle contraction and the role of plasma proteins in health and disease.
5. Define enzymes, explain enzyme kinetics, and describe factors influencing enzyme activity and inhibition.
6. Explain major metabolic pathways (carbohydrates, amino acids, lipids) and how they are interlinked, and understand metabolic regulation and adaptations in different nutritional states.
7. Discuss blood glucose regulation and its dysfunction in conditions like diabetes mellitus, and explain metabolic derangements in such diseases.

Prerequisites
Basic knowledge of biology, chemistry, and physics.

Theory (40 hours)

Topic	Content
1. Cell Structure and Function, Subcellular Organelles, Biological Membranes and Transport Mechanisms (5 hours)	- Overview of cell structures and organelles. - Mechanisms of membrane transport: diffusion, osmosis, and active transport. - Ion channels and their role in cellular function.
2. Biomolecules and Stereoisomerism (10 hours)	- Classification and function of carbohydrates, lipids, proteins, and amino acids. - Introduction to stereoisomerism and its importance in biochemical processes. - Chemical structure and function of monosaccharides, amino acids, and fatty acids. - Structure-function relationships in proteins and examples of their physiological roles. - Hemoglobin and myoglobin: O_2 transport mechanisms and clinical implications. - Muscle contraction: molecular mechanisms and clinical relevance. - Plasma proteins and their roles in health and disease.
3. Enzymes and Enzyme Kinetics (5 hours)	- Enzyme nomenclature and classification. - Basic enzyme kinetics: Km, Vmax, and enzyme-substrate interactions. - Factors influencing enzyme activity: temperature, pH, substrate concentration. - Enzyme inhibition: competitive and non- competitive inhibition.
4. Metabolic Pathways and Interrelationships (10 hours)	- Principles of metabolism and pathway characteristics. - Carbohydrate, amino acid, and lipid metabolism. - Interconnections between metabolic pathways and energy production.
5. Regulation of Metabolism (10 hours)	- Organ interrelationships in metabolism (liver, muscle, adipose). - Blood glucose regulation and dysfunction in diabetes mellitus. Metabolic adaptations in different nutritional states: fed, fasting, and starvation. - Metabolic derangements in diabetes mellitus.

Practical (50 hours)

Topic	Content
1. Introduction to the Laboratory (2 hours)	- Identify and use basic laboratory equipment (e.g., pipettes, test tubes, microscopes). - Learn safety procedures (e.g., wearing lab coats, using gloves, disposing of waste correctly).
2. Cell Structure & Function - Microscopic Examination (6 hours)	- Observe and identify basic cell structures using a light microscope. - Prepare slides of animal and plant cells. - Identify key structures like the nucleus, mitochondria, and cell membrane. - Draw and label the structures observed under the microscope.
3. Membrane (6 hours)	- Use simple models (e.g., egg membranes or cell membrane models) to observe membrane structure. - Study the permeability of membranes using basic materials like water, dyes, and oils.
4. Membrane Transport (8 hours)	- **Diffusion**: Place dye in water and observe its spread over time. - **Osmosis**: With potato strips or dialysis tubing to observe water movement. - **Active Transport**: Simulate the use of ATP in transporting ions across membranes using simple models. - Record results and discuss how these processes apply to human cells.
5. Ion Channels (6 hours)	- Study ion movement across membranes using simple models or simulations. - Simulate ion transport across membranes using an artificial model or computer simulation. - Observe how ion movement is affected by changes in concentration and membrane properties. - Record findings and explain how this relates to human physiology.

6. Enzyme (8 hours)	- Investigate enzyme function, kinetics, and inhibition. - **Enzyme Nomenclature and Classification**: Familiarize with enzyme types. - **Enzyme Kinetics**: Study simple reactions like amylase activity and catalase activity. - **Amylase Activity**: Observe breakdown of starch into simpler sugars. - **Catalase Activity**: Observe the breakdown of hydrogen peroxide into oxygen and water. - Record time taken for reactions and calculate Km and Vmax. - Study factors influencing enzyme activity (temperature, pH, substrate concentration). - Demonstrate enzyme inhibition using enzyme-substrate models.
7. Regulation of Metabolic Pathways (8 hours)	- **Organ Interrelationships**: Perform assays to measure glucose and glycogen in liver, muscle, and adipose tissue. - **Blood Glucose Regulation**: Use a glucometer to measure blood glucose levels at different times (e.g., fasting, after a meal). - **Metabolic Adaptation**: Simulate fasting and feeding states and observe changes in plasma glucose, protein, and lipid levels. - Discuss findings in the context of diabetes and other metabolic states.
8. Interpretation of Biochemical Data (4 hours)	- Analyze and interpret experimental data from previous experiments (e.g., enzyme activity, blood glucose levels). - Identify normal and abnormal patterns in metabolic data, linking them to clinical conditions. - Discuss how laboratory findings help in diagnosing diseases like diabetes and metabolic disorders.

BPA 05. INTRODUCTION TO MICROBIOLOGY

Settings and learning methodology

A combination of classroom lectures**,** clinical exposure**,** and hands-on laboratory sessions will be used**.** The teaching methodologies include interactive lectures**,** case-based learning**,** problem-solving exercises, and demonstrations to facilitate both theoretical understanding and practical skills.

Goal:

To introduce students to the world of microorganisms, their classification, and their role in health and disease. This course covers the basic principles of microbiology with a focus on bacterial structure, function, and interactions with the human host, laying the foundation for clinical microbiology.

Learning Objectives:

By the end of this course, students should be able to:

1. Understand the diversity of microorganisms and their ecological roles.
2. Identify and classify major groups of microorganisms (bacteria, viruses, fungi, protozoa, helminths).
3. Describe the general features of microbial structure, physiology, and reproduction.
4. Explain microbial mechanisms of pathogenesis and host defense mechanisms.
5. Recognize the role of microorganisms in disease transmission and public health.
6. Apply basic laboratory techniques for microbial identification and analysis.

Theory (40 Hours)

No.	Topic	Content
1	**Introduction to Microbiology (3 Hours)**	History of microbiology and its significance in healthcare. Classification and nomenclature of microorganisms (Binomial system).
2	**Basic Microbial Structure and Function (6 Hours)**	Prokaryotic vs. Eukaryotic cells. Structure of bacteria (cell wall, membrane, flagella, pili, capsules). Binary fission and microbial reproduction. Structure and classification of viruses. Basic characteristics of fungi, protozoa, and helminths.
3	**Microbial Physiology (5 Hours)**	Microbial metabolism: nutritional requirements, energy production. Growth and reproduction: growth phases, measurement of growth. Microbial genetics: DNA replication, transcription, translation, and mutations.
4	**Human Microbiota (4 Hours)**	Normal flora: Sites of colonization and importance. Host-microbe interactions: Symbiosis, commensalism, mutualism, parasitism. Role of microbiota in immunity and disease prevention.
5	**Pathogenesis of Infectious Diseases (5 Hours)**	Mechanisms of microbial pathogenicity. Virulence factors: Enzymes, exotoxins, endotoxins. Infection process: Entry, adhesion, colonization, invasion, dissemination.
6	**Infection Transmission and Control (5 Hours)**	Modes of transmission: Direct, indirect, and vector-borne. Nosocomial infections: Prevention and sources. Infection control measures: Hand hygiene, disinfection, sterilization.

7	**Host Defense Mechanisms (4 Hours)**	Innate immunity: Barriers, phagocytosis, complement system. Adaptive immunity: Humoral and cellular immunity. Immunization. Principles of vaccination, immune response to vaccines, and the concept of memory immunity. Types of vaccines.
8	**Introduction to Antimicrobial Therapy (4 Hours)**	Overview of antimicrobial agents: Antibiotics, antivirals, antifungals. Mechanisms of action and spectrum of activity. Antimicrobial resistance: Causes and strategies for prevention.
9	**Laboratory Diagnosis of Infectious Diseases (3 Hours)**	Basic microbiological laboratory techniques: Culture, staining, and microscopy. Identification methods: Biochemical tests, molecular techniques. Antimicrobial susceptibility testing: Disc diffusion, MIC.

Practical (50 Hours)

No.	Topic	Content
1	**Microscopy and Staining Techniques (7 Hours)**	Learn gram staining, acid-fast staining, and special stains. Examine bacterial and fungal specimens under the microscope.
2	**Cultivation of Bacteria (8 Hours)**	Take part in the preparation of agar media and inoculation techniques. Observe bacterial growth and use of selective/differential media.
3	**Identification of Bacterial Species (8 Hours)**	Observe biochemical identification tests: Catalase, coagulase, oxidase. Get familiarized with the laboratory diagnosis of common pathogens.
4	**Antibiotic Susceptibility Testing (6 Hours)**	Learn the Kirby-Bauer disk diffusion method. Determine the minimum inhibitory concentration.
5	**Collection of Clinical Samples (6 Hours)**	Observe and get familiarized with techniques for obtaining clinical samples (blood, urine, sputum, wound swabs). Learn safe handling and transportation of specimens.
6	**Nosocomial Infections and Infection Control (5 Hours)**	Observe infection control practices in the hospital. Understand the waste management protocols in laboratories and healthcare settings.
7	**Microbial Pathogenesis in Disease (10 Hours)**	Discuss clinical scenarios (mock scenarios or from clinical cases) like urinary tract infection, pneumonia, tuberculosis. Learn how to identify hospital-acquired infections and the common pathogens involved.

BPA 06. INTRODUCTION TO HEALTHCARE DELIVERY SYSTEM IN INDIA

***Goal*:**

This course provides the students a basic insight into the main features of Indian health care delivery systems and how it compares with other systems of the world.

Theory (30 hours)

No.	Topic	Subtopics
1	**Introduction to Healthcare Delivery System**	a. Healthcare delivery system in India at primary, secondary, and tertiary care b. Community participation in healthcare delivery system c. Health system examples in developing and developed countries d. Private sector e. National Health Mission f. National Health Policy g. Issues in healthcare delivery system in India
2	**National Health Programmes**	Background, objectives, action plan, targets, operations, achievements, and constraints in various National Health Programmes
3	**Introduction to AYUSH System of Medicine and medical pluralism**	Ayurveda, Yoga and Naturopathy, Unani ,Siddha Homeopathy
4	**Health Scenario in India - Past, Present, and Future**	Overview of the health scenario, changes over time, and emerging trends for the future of healthcare in India
5	**Demography & Vital Statistics**	a. Demography – Concepts b. Vital events of life and its impact on demography c. Significance and recording of vital statistics d. Census & its impact on health policy

Practical (30 hours)

During the practical hours, the student students will have guided visits to different health systems and observe their functioning. They will shadow providers of AYUSH (one day allotted for each system) to understand the functioning of medical pluralism in India and patient preferences.

BPA 07. FUNCTIONAL ENGLISH AND SOFT SKILLS

Goal and justification

English is the language used for written communication in Medicine in India. Effective communication is an important tool in medicine and directly affects the outcomes in patient care. A student may be very good in clinical skills but may perform poorly in his/her profession due to lack of adequate English language skills. Though English is taught in schools, it is commonly observed that there is a wide gap in the communication skills as students converge from diverse backgrounds. This review course in English attempts to bridge this gap. A brief review of the English grammar will be done in the class room and students will be given ample exercises to perform during the practical training. The soft skills training help develop in a student the right attitude to deal with patients and peers, help build interpersonal relationships and leadership skills.

Learning objectives

At the end of this course, the student should be able to:

- Be capable of understanding speeches and lectures
- Use English language effectively in day to day communications concerning patient care and professional issues.
- Capable of presenting clear, detailed descriptions on a wide range of subjects related to medicine
- Able to use the language in reasoning and arguing.

The medical domain related specific language skills will be dealt in the subject _medical communications‘ in Semester IV

Total lecture hours: 20

S. No.	Topic
1	Review of English grammar
2	Principles of effective reading, listening, and writing
3	Composing sentences
4	Composing paragraphs
5	Precis Writing and paraphrasing
6	Principles of writing essays
7	Developing paragraphs from hints, story writing
8	Letter writing principles
9	Soft skills in: Self-management, ownership of tasks, manners, social etiquette, effective communication skills, interpersonal skills, bedside manners, time management, adaptability and flexibility, conduct in difficult situations

Practical (40 hours)

English: Each lecture will be followed by guided practical exercises.

Soft skills: Discussions on case-based scenarios and role-play exercises will be embedded within class room lectures.

BPA 08. Community Orientation-I

Goals:

To provide the students with transformative educational experiences as they engage in ‗health' activities within a wide variety of communities.

Learning Objectives

This longitudinal course will build on itself with each semester, increasing the students' understanding and engagement with communities and the people within. Students will learn to identify social determinants of health as they engage during their training. The students will also gain experience and a deeper understanding of providing health care with social accountability to the patient/community as a core concept.

Theory (20 hours)

S. No.	Topic and Hours	Content
1	**Introduction to Public Health (4 hours)**	- What is Public Health?
		- Core functions of public health: assessment, policy development, assurance
		- History and the development of public health in India
		- Basic principles and practice of public health
		- Public Health vs. Clinical Medicine: How They Intersect
2	**Social Determinants of Health (6 hours)**	- Defining social determinants: socioeconomic status, education, housing, access to care
		- The impact of social inequality on health outcomes with historical and contemporary examples from India
		- Addressing social determinants in clinical practice
3	**Health Promotion and Disease Prevention (4 hours)**	- Primary, Secondary, and Tertiary Prevention
		- Strategies for Disease Prevention (Vaccination, Screening, Lifestyle Modifications)
		- Health Promotion in Clinical Practice
4	**Health Indicators (6 hours)**	- Definition
		- Morbidity and mortality rates: Disease prevalence, mortality rates, and life expectancy
		- Infant mortality rate: The number of infant deaths per 1,000 live births
		- Chronic disease prevalence: Rates of conditions like diabetes, hypertension, or heart disease
		- Access to healthcare: Measures of availability and accessibility of healthcare services
		- Behavioural health indicators: Rates of smoking, alcohol use, exercise, and nutrition

Practical (10 hours)

Students will visit a local community to observe and identify key social determinants of health, such as housing, education, access to clean water, healthcare facilities, and employment. The aim is to understand how these factors influence health outcomes in real life.

Books for reference

1. Introduction to Public Health by Mary-Jane Schneider – Publisher: Jones & Bartlett Learning, Year: 2016
2. Social Determinants of Health: A Comparative Approach by Alan Davidson – Publisher: Oxford University Press, Year: 2017

YEAR I-SEMESTER II

BPA 09. PROFESSIONALISM

Goal:

This course introduces students to the concept of professionalism in healthcare, focusing on professional values, ethics, and teamwork. It highlights the importance of professional identity and behaviour for PAs in India and their impact on patient care, communication, and collaboration within healthcare teams.

Learning Outcomes:

By the end of this course, students will be able to:

- Demonstrate professionalism, including integrity, empathy, and confidentiality, in clinical settings.
- Make ethical decisions based on established principles.
- Recognize and manage bias, ensuring equal care for all patients.
- Work effectively within healthcare teams to provide collaborative patient care.
- Practice culturally sensitive communication to deliver respectful, inclusive care.

Theory (10 hours)

Topic	Content
1. Professional Values (2 Hours)	Integrity, objectivity, empathy, professional competence, and confidentiality.
2. Personal Values: Ethical and Moral Values (2 Hours)	Ethical vs. moral values, personal integrity, and their impact on professional conduct.
3. Attitude and Behaviour (2 Hours)	Professional behaviour in healthcare, addressing biases, and treating patients equally.
4. Code of Conduct, Professional Accountability, and Misconduct (2 Hours)	Code of conduct for healthcare professionals, professional accountability, and implications of misconduct.
5. Differences Between Professions and Importance of Teamwork (1 Hour)	Understanding roles in a healthcare team and the significance of teamwork in patient care.
6. Cultural Issues in the Healthcare Environment (1 Hour)	Cultural competence, overcoming cultural barriers, and providing respectful care.

Topic	Content
Practical (10 Hours)	
1. Demonstrate professional values through role-play scenarios	Integrity and confidentiality through role-play scenarios.
2. Discuss and analyze ethical dilemmas	Focus on decision-making frameworks and resolving ethical dilemmas in healthcare.
3. Role-play scenarios to address biases	Emphasize impartial treatment in healthcare delivery.
4. Team-based tasks	Case reviews, care planning, and clinical decision-making to promote collaboration in healthcare teams.
5. Role-play interactions with patients	Focus on cultural sensitivity and effective communication with diverse cultural backgrounds.

Books for reference

1. Medical Ethics: A Guide for Medical Students – Dr. S. R. S. Reddy, Elsevier India, 2010
2. Professionalism in Medicine: A Case-Based Guide – Dr. Sangeeta S. S., Jaypee Brothers Medical, 2014
3. Cultural Competence in Health Care: A Practical Guide – Dr. S. N. A. Sharma, Jaypee Brothers Medical, 2017
4. Principles of Biomedical Ethics – Tom L. Beauchamp & James F. Childress, Oxford University Press, 2012

BPA 10. ANATOMY - II

Goal

To provide a detailed understanding of human anatomy across all major body systems The course emphasizes clinical relevance and imaging techniques, and aims to prepare students for clinical practice by integrating systemic anatomy with clinical scenarios.

Theory (50 hours)

Topics	Content
1. Musculoskeletal System (8 hours)	Bones: Structure, Classification, Functions; Joints: Types, Movements; Muscles: Major muscles, Actions, Innervations; Clinical Relevance: Fractures, Dislocations, Sprains, Strains, Joint Infections, Muscle Injuries; Imaging: Basic imaging (fractures, arthritis, etc.)
2. Nervous System (10 hours)	CNS (Brain, Spinal Cord); PNS (Cranial & Spinal nerves, Autonomic Nervous System); Functional Areas of the Brain (Sensory, Motor Areas); Clinical Relevance: Neurological Disorders (Stroke, MS, Parkinson's); Imaging: CT, MRI of brain and spine
3. Respiratory System (6 hours)	Anatomy: Upper & Lower Respiratory Tract, Lungs, Diaphragm; Mechanism of Breathing; Gas Exchange; Clinical Relevance: Asthma, Pneumonia, COPD; Imaging: Chest X-ray, CT
4. Cardiovascular System (6 hours)	Heart Anatomy: Chambers, Valves, Conduction System; Vascular System: Arteries, Veins; Cardiac Cycle; Clinical Relevance: Myocardial Infarction, Arrhythmias, Stroke; Imaging: Chest X-ray, Echocardiography, Angiography, MRI
5. Gastrointestinal System (6 hours)	Anatomy: Oral cavity, Esophagus, Stomach, Intestines, Accessory Organs; Digestion & Absorption; Clinical Relevance: Ulcers, IBD, Crohn's Disease, Appendicitis, Cirrhosis; Imaging: Abdominal X-ray, CT, Ultrasound
6. Urinary System (5 hours)	Anatomy: Kidneys, Renal Blood Supply, Nephron Structure, Urinary Tract; Clinical Relevance: Kidney Stones, UTIs, Nephrotic Syndrome; Imaging: Renal Ultrasound, CT Scans
7. Endocrine System (5 hours)	Endocrine Glands: Pituitary, Thyroid, Adrenal, Pancreas, Gonads; Hormones & Regulation; Clinical Relevance: Diabetes, Hyperthyroidism, Addison's Disease; Imaging: Ultrasound, CT

8. Lymphatic System (4 hours)	Anatomy: Lymph Nodes, Lymphatic Vessels, Spleen, Thymus, Tonsils; Function: Immunity, Fluid Balance, Fat Absorption; Clinical Relevance: Lymphoma, Lymphedema; Imaging: Lymphoscintigraphy, Ultrasound
9. Reproductive System (4 hours)	Male & Female Reproductive System: Anatomy; Pregnancy & Development; Clinical Relevance: PCOS, Prostate Cancer, Erectile Dysfunction; Imaging: Ultrasound for Male/Female Reproductive Pathologies
10. Sensory System (4 hours)	Anatomy: Eyes, Ears, Skin; Sensory Pathways: Visual, Auditory, Tactile; Clinical Relevance: Sensory Deficits, Disorders

Practical hours (70)

Topics	Content
1. Musculoskeletal System (12 hours)	Dissection of Bones, Joints, Muscles; Clinical Skills: Palpation, Flexibility & Strength Assessment, Sprain/Strain/Fracture/Dislocation Examination
2. Nervous System (10 hours)	Dissect Brain, Spinal Cord, Cranial/Spinal Nerves; Clinical Skills: Neurological Examination (Cranial Nerves, Motor/Sensory Function, Reflexes); Neuroimaging: CT, MRI
3. Respiratory System (8 hours)	Dissect Respiratory Structures; Clinical Skills: Stethoscope Use, Chest Palpation; Imaging Skills: Chest X-ray, CT
4. Cardiovascular System (8 hours)	Dissect Heart and Blood Vessels; Clinical Skills: Pulse, Auscultation, Blood Pressure Measurement, ECG; Imaging Skills: Echocardiography, Angiography
5. Gastrointestinal System (8 hours)	Abdominal Dissection; Clinical Skills: Abdominal Palpation, Inspection, Percussion; Imaging Skills: Abdominal Pathologies Interpretation
6. Urinary System (7 hours)	Dissect Kidneys, Urinary Tract; Clinical Skills: Palpation for Kidney Enlargement/Tenderness; Imaging Skills: Renal Pathologies Interpretation
7. Endocrine System (4 hours)	Study Thyroid & Parathyroid Anatomy; Clinical Skills: Palpation for Goiter/Masses; Imaging Skills: Ultrasound, CT
8. Lymphatic System (3 hours)	Dissect Lymph Nodes; Clinical Skills: Palpation for Infection/Malignancy; Imaging Skills: Lymphoscintigraphy
9. Reproductive System (5 hours)	Study Male/Female Reproductive Anatomy; Clinical Skills: Testes & Pelvic Examination; Imaging Skills: Pelvic Ultrasound for Reproductive Pathologies

Books for reference

1. "Human Anatomy" by Dr. B.D. Chaurasia, CBS Publishers, 2013
2. "Gray's Anatomy for Students" by Richard Drake, A. Wayne Vogl, Adam W. M. Mitchell, Elsevier, 2013

BPA 11.PHYSIOLOGY - II

Goal:

Physiology II builds upon the foundational concepts learned in Physiology I and delves deeper into advanced physiological systems, particularly focusing on the nervous, musculoskeletal, reproductive, and immune systems. This course also integrates the clinical applications of these systems, emphasizing their role in maintaining homeostasis and responding to pathologies.

Learning Objectives:

By the end of Physiology II, students should be able to:

- Understand the organization and function of the nervous system, including sensory and motor functions.
- Describe the mechanisms of muscle contraction, muscle types, and their role in movement.
- Explain the physiology of the immune system, including the innate and adaptive immune responses.
- Understand the physiological regulation of the reproductive system, including hormonal control and reproductive processes.
- Integrate the physiological functions of multiple organ systems to explain complex clinical conditions and their pathophysiology.

Pre-requisites:

Completion of Physiology I and basic understanding of cellular biology and biochemistry.

Theory (50 hours)

Topic	Content
1. Nervous System (15 hours)	Structure and function of CNS and PNS, neurons and neuroglia: structure, function, and communication. Synaptic transmission and neurotransmission. Mechanisms of neurotransmitter release, receptors, and signal transduction. Sensory physiology: mechanoreception, photoreception, thermoreception, nociception. Motor control and reflexes: muscle tone, voluntary and involuntary movements, motor cortex, spinal cord reflexes, basal ganglia, cerebellum.
2. Musculoskeletal Physiology (10 hours)	Muscle types and properties: skeletal, smooth, and cardiac muscle—structure, function, and regulation. Mechanism of muscle contraction (sliding filament theory). Muscle fatigue and recovery. Muscle strength and exercise physiology: muscle recruitment, force generation, neuromuscular junction physiology, excitation-contraction coupling. Bone and joint physiology: bone formation, remodeling, repair, biomechanics of joints and movements.
3. Immune System Physiology (8 hours)	Innate immunity: physical barriers, phagocytosis, inflammation, complement system. Adaptive immunity: antigens, antibodies, antigen-presenting cells, B and T lymphocyte responses, memory cells, immunological memory. Immunoregulation: cytokines and their role, immunological tolerance, and autoimmunity.
4. Reproductive System Physiology (7 hours)	Male and female reproductive systems: anatomy and physiology of male and female reproductive organs. Hormonal regulation: hypothalamic-pituitary-gonadal axis. Oogenesis, spermatogenesis, fertilization. Physiology of pregnancy and lactation.
5. Advanced Integration (10 hours)	Integration of physiology across organ systems: hormonal regulation of metabolism and energy balance. Interactions between the cardiovascular, renal, and endocrine systems in maintaining homeostasis. Clinical integration and pathophysiology: hypertension, diabetes, respiratory failure, and the impact of aging on organ systems.
6. Clinical Physiology (3 hours)	Clinical assessments: interpretation of vital signs, laboratory data, diagnostic tests. Physiological aspects of disease diagnosis and monitoring.

Practical (70 Hours)

Topic	Content
1. Nervous System Physiology (12 hours)	Measuring action potentials: frog nerve-muscle preparation or nerve conduction simulator. Reflex testing: patellar reflex, Achilles reflex, latency, and intensity. Sensory testing: measuring sensory thresholds with a two-point discriminator and monofilaments for pain and pressure sensation. Visual and auditory tests.
2. Musculoskeletal Physiology (14 hours)	Muscle contraction experiments: recording muscle contractions in frog skeletal muscle using a myograph. Exercise physiology: measuring heart rate, blood pressure, and respiratory rate during physical activities. Bone and joint mechanics: kinematic measurements using goniometers to assess joint range of motion.
3. Immune System Physiology (8 hours)	Immunological assays: performing ELISA to detect antibodies or antigens in serum samples. Phagocytosis: observing phagocytic activity of white blood cells using a microscope in response to bacteria.
4. Reproductive System Physiology (8 hours)	Hormonal assays: measuring levels of estrogen and testosterone using simulation kits or assays. Discussing hormonal levels during different phases of the menstrual cycle or physical stimuli.
5. Clinical Physiology (10 hours)	ECG analysis: interpreting ECGs, correlating clinical condition with heart rate, voltages, cardiac rhythms, and common arrhythmias. Blood pressure and blood gas analysis: measuring arterial blood pressure, interpreting changes, analyzing oxygen and carbon dioxide levels and acid-base balance.

Books for reference

1. Textbook of Medical Physiology by Guyton & Hall, Elsevier, 14th Edition, 2020.
2. Human Physiology: An Integrated Approach by Dee Unglaub Silverthorn, Pearson, 7th Edition, 2019.

BPA 12.BIOCHEMISTRY AND MOLECULAR BIOLOGY - II

Goal

To provide students with a deeper understanding of the biochemical processes involved in food assimilation, digestion, metabolism, and storage, while emphasizing their clinical relevance. The course aims to integrate core concepts in nutrition, hormonal regulation, genetics, and RNA biology, with a focus on the biochemical mechanisms underlying health and disease. By the end of the course, students will be able to analyze biochemical data, interpret clinical scenarios, and understand the molecular foundations of metabolic disorders and genetic diseases.

Learning Objectives:

At the end of the course, students will be able to:

- Understand the biochemical mechanisms of digestion, absorption, and storage of nutrients and their impact on metabolism.
- Explain the biochemical roles of macronutrients and micronutrients in maintaining metabolic functions and overall health.
- Describe the biochemical pathways and regulatory mechanisms involved in the metabolism of carbohydrates, fats, and proteins.
- Identify the role of hormones in metabolism, fluid balance, and homeostasis, and recognize disorders associated with hormonal dysregulation.
- Demonstrate an understanding of acid-base regulation and its clinical relevance, particularly in the interpretation of arterial blood gas (ABG) results.
- Apply knowledge of genetics to understand inheritance patterns, genetic mutations, and the use of genetic testing in disease diagnosis and management.
- Explain the role of RNA in gene expression and regulation, and its clinical relevance in diagnostics and therapy.
- Gain hands-on experience in laboratory techniques used to assess metabolic status, hormone levels, genetic information.

Theory (50 Hours)

Topics	Sub-topics
1. Food Assimilation, Absorption, Digestion, Metabolism, and Storage (10 hours)	- Digestion of Macronutrients: Carbohydrates, fats, and proteins. - Digestive Enzymes: Action on carbohydrates, lipids, and proteins (e.g., amylase, lipase, proteases). - Absorption in the Gut: Transport mechanisms for glucose, amino acids, lipids; enzymes involved. - Nutrient Uptake: Biochemical pathways for vitamins and minerals (e.g., iron, calcium, magnesium). - Nutrient Storage and Mobilization: Glycogen, triglycerides, and protein storage in the body; mobilization during fasting and feeding states.
2. Biochemical Effects of Nutrition on Metabolism, Cell Functions, and Overall Health (10 hours)	- Macronutrients and micronutrients: Role of proteins, carbohydrates, fats, vitamins, and minerals in metabolism. - Metabolic Pathways: Glycolysis, TCA cycle, electron transport. - Nutritional Deficiencies and Disorders: Biochemical consequences. - Nutrition and Cell Functions: Influence on cell signalling, gene expression, and metabolic regulation.
3. Hormones and Their Role in Metabolism and Homeostasis (10 hours)	- Hormone Definition and Classification: Peptide, steroid, and amine hormones. - Hormone Receptors: Types and their role in signal transduction. - Hormone Synthesis and Secretion: Biosynthesis and release mechanisms. - Mechanism of Action: Receptor binding and downstream signalling. - Hormonal Regulation of Metabolism: Insulin, glucagon, thyroid hormone, etc. - Regulation of Water and Electrolyte Balance: Aldosterone, ADH, and fluid balance. - Hormonal Regulation of Reproduction:

	- Menstrual cycle, pregnancy. Disorders of Hormonal Regulation: Hypothyroidism, diabetes, Cushing's syndrome. - Hormonal Interactions with Drugs: Effects on metabolism.
4. Homeostasis with Emphasis on pH, Buffering, and Electrolyte Balance (10 hours)	- Acid-Base Regulation: pH regulation and homeostasis. - Buffers: Bicarbonate, phosphate, and protein buffers. - Compensatory Mechanisms: Respiratory and renal regulation. - Acidosis and Alkalosis: Pathophysiology, causes, and effects. - Fluid and Electrolyte Balance: Sodium, potassium distribution, and disorders. Assessment of Acid-Base Status: Interpretation of ABG results.
5. Introduction to Genetics in Medicine (5 hours)	- Genetic Principles: Relevance in disease diagnosis and treatment. - DNA Structure and Function: Chromosomes, genetic code. - Gene Expression and Regulation: Transcription, translation, epigenetics. - Genetic Mutations and Disorders: Common genetic disorders (e.g., sickle cell anemia, cystic fibrosis). - Inheritance Patterns: Mendelian inheritance, autosomal dominant and recessive. - Genetic Testing for Diagnosis: PCR, sequencing, microarrays. Genetic Counselling: Risk assessment and management of inherited diseases.

6. RNA: Structure, Function, and Clinical Relevance (5 hours)	- RNA Structure and Types: mRNA, tRNA, rRNA, and non- coding RNAs. - RNA Transcription and Post-transcriptional Modifications. - RNA Translation and Protein Synthesis: Mechanism of translation. - Gene Regulation by RNA: Role in gene silencing and regulation. - Clinical Relevance of RNA: RNA in disease (e.g., COVID- 19), diagnostic applications. - RNA-based Therapeutics: mRNA vaccines, gene editing.

Practical (30 Hours)

Topics	Sub-topics
1. Collection and Analysis of Gastric Juice (5 hours)	- Understand the biochemical composition of gastric juice and its role in digestion. - Collect gastric juice for analysis of pH, enzyme activity (e.g., pepsin), and digestive capacity.
2. Measurement of pH in Biological Fluids (4 hours)	- Measure and interpret pH of biological fluids (blood, urine, gastric juice). Use pH meters to assess pH changes under physiological conditions and understand buffering mechanisms.
3. Interpretation of Arterial Blood Gas Results (5 hours)	- Analyze ABG data from clinical cases to diagnose acid-base disorders. Assess compensatory mechanisms.
4. Estimation of Blood Analytes (Glucose, Cholesterol, Uric Acid, Electrolytes, Urea) (5 hours)	- Measure blood analytes using clinical kits. Discuss their relevance in clinical scenarios like diabetes, kidney disease, cardiovascular disorders.
5. Hormone Assay Simulation (4 hours)	- Simulate hormone assays (e.g., insulin, glucagon, cortisol). - Understand hormonal regulation of metabolism and fluid balance.
6. Genetic Testing Simulation (4 hours)	- Simulate genetic testing (e.g., PCR diagnostics). - Identify genetic mutations associated with diseases like cystic fibrosis or sickle cell anemia.
7. RNA Isolation and Analysis (3 hours)	-- Explore RNA structure and its diagnostic relevance.

Books for reference

- Biochemistry by Satyanarayana U, Chakrapani U, Elsevier, 4th Edition, 2018.
- Harper's Illustrated Biochemistry by Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, McGraw-Hill, 30th Edition, 2019

.BPA13. MEDICAL MICROBIOLOGY

Goal

To provide an in-depth understanding of medical microbiology with an emphasis on the etiology, pathogenesis, laboratory diagnosis, treatment, and prevention of infectious diseases encountered in clinical practice.

Learning Objectives:

By the end of this course, students should be able to:

1. Identify the major bacterial, viral, fungal, and parasitic pathogens responsible for human diseases.
2. Understand the pathogenesis, clinical manifestations, and complications of infectious diseases.
3. Utilize laboratory techniques for accurate diagnosis of infectious diseases.
4. Recognize the principles of antimicrobial chemotherapy, resistance, and stewardship.
5. Apply infection control practices to prevent and manage healthcare-associated infections.

Theory (60 Hours)

Topics	Content
1. Bacterial Infections and Pathogenesis (8 hours)	- Overview of normal human microbiota and its role in disease. - Virulence factors: Exotoxins, endotoxins, enzymes, and surface proteins. - Nosocomial infections: Prevention, risk factors, and control.
2. Immune Responses to Bacterial Infections (6 hours)	- Innate immunity: Skin, mucous membranes, phagocytosis. - Adaptive immunity: Antibodies, T cells, and cytokines. - Immune evasion strategies by pathogens.
3. Antimicrobial Chemotherapy (6 hours)	- Types of antimicrobial agents: Antibiotics, antivirals, antifungals. - Mechanisms of antimicrobial action. - Antimicrobial resistance: Mechanisms, epidemiology, and prevention.
4. Bacterial Diseases and Pathogens (12 hours)	- Key bacterial pathogens (Staphylococcus, Streptococcus, E. coli, Mycobacterium, Salmonella). - Clinical presentation, diagnosis, and treatment of bacterial infections. - Laboratory diagnosis: Culture, PCR, serology, and rapid tests.
5. Viral Infections and Pathogenesis (10 hours)	- Key viral pathogens (Influenza, HIV, Hepatitis, Herpes). - Virus-host interactions and pathogenesis of viral diseases. - Clinical manifestations, diagnosis, and treatment of viral infections.
6. Parasitic Infections (6 hours)	- Protozoa and helminths: Life cycles, pathogenesis, and clinical features. - Common parasitic diseases (malaria, amoebiasis, schistosomiasis). - Laboratory diagnosis: Microscopy, antigen detection, molecular methods.

7. Fungal Infections (5 hours)	- Classification of fungi: Yeasts, molds, and dimorphic fungi. - Pathogenesis and clinical features of fungal infections. - Laboratory diagnosis of fungal infections.
8. Infection Control and Prevention (4 hours)	- Principles of infection control: Standard precautions, transmission-based precautions. - Sterilization, disinfection, and hygiene in healthcare. - Surveillance and outbreak management in hospitals.
9. Healthcare-Associated Infections (3 hours)	- Etiology, risk factors, and prevention strategies. - Infection control guidelines: NABH, JCI standards.
10. Biomedical Waste Management (3 hours)	- Principles of biomedical waste management in healthcare. - Segregation, collection, and disposal of medical waste.

Practical (40 Hours)

Topics	Content
1. Collection and Processing of Clinical Samples (6 hours)	- Get introduced to collection techniques for blood, urine, sputum, and wound swabs. - Familiarize with the use of transport media and sterile techniques for handling clinical samples.
2. Identification of Pathogens in Clinical Samples (8 hours)	- Gain experience in microbiological analysis of common pathogens from clinical samples. - Learn techniques in microscopy and biochemical identification to differentiate between bacterial species.
3. Antibiotic Sensitivity Testing (6 hours)	- Hands-on experience with Kirby-Bauer disk diffusion method for testing antibiotic susceptibility. - Familiarize with the procedure for determining minimum inhibitory concentration using dilution techniques.
4. Infection Control Measures in Healthcare (8 hours)	- Observe infection control protocols in healthcare settings, including proper hand hygiene, use of PPE, and disinfection procedures. Understand the role of healthcare workers in preventing nosocomial infections.

5. Case Studies and Clinical Scenarios (8 hours)	- Apply microbiological techniques to diagnose, manage, and treat infectious diseases like sepsis, pneumonia, and meningitis. - Interpretation of blood cultures, identification of pathogens, and appropriate antibiotic therapy. Guide treatment decisions based on microbiological results.
6. Biomedical Waste Handling and Management (4 hours)	- Gain practical knowledge of biomedical waste management in healthcare settings. Understand hospital protocols for managing medical waste and ensuring environmental and legal compliance.
7. Immunological Techniques in Clinical Diagnostics (4 hours)	- Familiarize with immunological techniques in diagnosing infections. Observe serological tests (e.g., ELISA) to detect antibodies for specific pathogens like HIV, hepatitis, and syphilis.
8. Vaccination and Immune Response in Clinical Practice (4 hours)	- Understand clinical application of vaccines and their role in preventing infections. - Assess vaccine efficacy by measuring antibody responses (e.g., Hepatitis B, Influenza). - Interpret immunological data to inform clinical decisions.

Books for reference

- Textbook of Microbiology by R. Ananthanarayan and C.K. Jayaram Paniker, Orient BlackSwan, 10th Edition, 2019.
- Medical Microbiology by Murray, P. R., Rosenthal, K. S., & Pfaller, M. A., Elsevier, 9th Edition, 2020

BPA 14.INTRODUCTION TO COMPUTERS

Goal:

To introduce the students to basics of using computers in context to their most common applications at the workplace such as: using Windows, understanding and using the Internet for knowledge acquisition, networking, making clinical presentations using PowerPoint, using Excel as a database etc., students will develop confidence and competence using these tools for data management, communication, and presentation.

Learning objectives

- Be able to identify computer hardware and peripheral devices
- Understand file management
- Accomplish creating basic documents, worksheets, presentations and databases
- Distinguish the advantages and disadvantages of networks
- Acquire working knowledge with email and recognize email etiquette
- Explore the Web and how to conduct research
- Identify computer risks and safety

Theory (30 hours) and Practical (50 hours) combined

Topic	Description
1. Computer Fundamentals	Introduction to computers, history, and parts (CPU, RAM, Storage).
2. Operating Systems	Overview of Windows, Mac OS, and Linux.
3. Customizing Desktop	Customizing Desktop, Start Menu, Taskbar, and file migration.
4. Basic Computer Functions	Save files, recognize formats, create folders, printer/Peripheral setup, troubleshooting.
5. Keyboard Functions	Familiarization with keyboard and special function keys.
6. Windows 11	Exploring and customizing Windows 11 desktop, start menu, taskbar, and folder migration.
7. File Management Settings	Folder views, accessibility settings in Windows 11, and MS-Word/Excel usage.
8. MS Word	Creating, organizing, and formatting documents, collaborating features (Merge, Edit, Track Mode).
9. MS Excel	Creating, analyzing, and formatting data, formulas, and workbook management.
10. MS PowerPoint	Creating, formatting presentations, managing comments, and exporting slides.
11. Internet Concepts	Browsing, downloading data, reading/writing emails.
12. URL & E-mail Concepts	Creating email accounts, sending/receiving emails, searching online, understanding online risks.
13. Social Media & Networking	Using LinkedIn, sharing knowledge on platforms like X, Academia.edu.
14. OneNote & Class Notebook	Creating sections, pages, and multimedia notes for collaboration.
15. Online Storage & Sharing	Using cloud storage platforms (Google Drive, OneDrive, Dropbox), and secure file sharing.

BPA 15. COMMUNITY MEDICINE -II

Goal:

This course aims to provide PA students with a foundational understanding of environmental health, epidemiology, and infectious disease control. The course emphasizes how these concepts affect health outcomes, patient care, and community health, and equips students with the knowledge to recognize and address public health challenges in clinical and community settings.

Settings and learning methodologies

The course will be delivered through a combination of theoretical lectures, practical exercises, and community-based activities. Theoretical concepts will be reinforced through real-world examples, field visits, and student engagement with local health initiatives.

1. **Classroom Setting:**
    - For theoretical discussions, case studies, and group activities.
    - Use of multimedia (e.g., videos, charts, and infographics) to explain complex environmental and epidemiological concepts.
2. **Community Field Visits:**
    - Visits to local communities to observe public health issues in action, such as water sanitation, food safety, and environmental hazards.
    - Interactions with local health workers to discuss the role of public health interventions and policies.
3. **Clinical Setting:**
    - Observation of infectious disease control measures in clinical practice.
    - Infection prevention and control activities, including vaccination campaigns and safe practices.

Learning Objectives:

- Identify and assess environmental health hazards, including air and water quality, occupational risks, toxicology, and climate change.
- Educate patients on the health impacts of environmental exposures and preventive measures.
- Advocate for policies and interventions that reduce environmental health risks.
- Define key epidemiological terms and concepts, such as incidence, prevalence, morbidity, and mortality rates.
- Understand the role of epidemiology in identifying health trends, patterns, and disease outbreaks.
- Differentiate between various types of epidemiological studies (descriptive, analytical, and experimental).
- Recognize the key epidemiological features of common infectious diseases (HIV, Influenza, TB, etc.).
- Understand infection control and prevention strategies in clinical settings.
- Discuss vaccination strategies and the importance of community immunity in preventing the spread of infectious diseases.
- Develop strategies for preventing foodborne diseases, promoting water safety, and addressing occupational health issues in community settings.
- Integrate knowledge of the built environment, food safety, and climate change in health promotion.

Theory (20 hours)

Topic	Hours	Content
1. Environmental Health	**10**	- **Air Quality and Pollution**: Indoor/Outdoor Air Quality- **Water Quality and Sanitation**: Waterborne diseases, Pathogens, Impact of poor sanitation, Sanitation education- **Water Pollution**: Contaminants (lead, mercury, pesticides, pharmaceuticals), Health risks- **Access to Clean Water**: Health disparities, Advocacy for water safety- **Toxicology and Environmental Chemicals**: Exposure to hazardous chemicals, Healthcare providers' role, Environmental toxicology- **Occupational Health**: Workplace hazards, Occupational diseases (respiratory diseases, cancers), Safety standards, Healthcare provider role- **Climate Change and Health**: Health impacts, Vulnerable populations, Mitigation and adaptation- **Built Environment and Public Health**: Urban planning, Housing and health, Green spaces- **Food Safety and Contamination**: Foodborne diseases, Prevention measures, Government health policies, Global initiatives
2. Basics of Epidemiology	**6**	- **Introduction to Epidemiology**: Role, Key terms (population, health-related events, distribution, determinants)- **Measures of Disease Frequency**: Incidence, Prevalence, Morbidity and Mortality rates- **Types of Epidemiological Studies**: Descriptive, Analytical, Experimental
3. Infectious Disease Control	**4**	- **Epidemiology of Infectious Diseases**: HIV, Influenza, TB- **Infection Control**: Prevention in clinical practice- **Vaccination Strategies**: Community immunity
Practical	**30**	- **Environmental Health**: Visit a neighborhood to assess air/water quality and conduct interviews/surveys on water usage and hand hygiene- **Occupational Health**: Observe ergonomic hazards in a hospital and discuss mitigation measures- **Climate Change and Health**: Visit PHC to observe climate change impacts on health (e.g., vector-borne diseases, heatstroke), read/discuss news articles on local climate change issues- **Basics of Epidemiology**: Calculate disease frequency measures using case studies and mock data, group analysis of health studies, present findings- **Infectious Disease Control**: Role-play scenarios of infectious disease outbreaks and observe infection control measures in a hospital

Books for reference:

1. Textbook of Preventive and Social Medicine by K. Park – Publisher: Banarsidas Bhanot Publishers, Year: 25th Edition, 2019.
2. Essentials of Epidemiology in Public Health by Ann Aschengrau and George R. Seage III – Publisher: Jones & Bartlett Learning, Year: 4th Edition, 2019.

YEAR II-SEMESTER III

BPA 16.PATHOLOGY

Goal:

To provide students with a thorough understanding of the mechanisms and causes of disease, enabling them to understand the natural history, clinical manifestations, and diagnostic principles of various diseases.

Learning Objectives:

By the end of the course, students will be able to:

- Understand cell injury mechanisms, tissue changes, and the healing capacity of the body.
- Grasp the normal homeostatic mechanisms and their derangements.
- Understand the pathogenesis, clinical effects, and clinico-pathological correlations of common diseases.
- Learn about neoplasia and its clinical significance in various tissues.
- Correlate morphology (macroscopic and microscopic) with disease processes.
- Understand hematological disorders, their diagnosis, and prognosis.
- Perform and interpret simple clinico-pathological procedures on biological samples.

Theory (50 Hours)

Topic	Contents
1. Introduction to Pathology and Techniques (3 hours)	Evolution of pathology, basic lab techniques, microscopy, and diagnostic procedures.
2. Cell Injury and Adaptations (5 hours)	Causes, mechanisms, and morphology of injury, cell death (necrosis, apoptosis, gangrene), biological aging.
3. Amyloidosis and Calcification (2 hours)	Pathogenesis, types, and clinical features of amyloidosis and calcification (dystrophic vs. metastatic).
4. Inflammation, Repair, Regeneration, and Fibrosis (5 hours)	Acute and chronic inflammation, wound and bone healing processes.
5. Circulatory Disturbances (4 hours)	Edema, thrombosis, embolism, infarction, shock pathophysiology, and fluid/electrolyte disturbances.
6. Growth Disturbances and Neoplasia (6 hours)	Cellular adaptations (atrophy, hypertrophy, hyperplasia, metaplasia), neoplasia, tumor diagnosis.
7. Immunopathology (5 hours)	Overview of the immune system, hypersensitivity reactions, immunodeficiencies, autoimmune disorders.
8. Infectious Diseases (5 hours)	Mycobacterial, bacterial, viral, fungal, parasitic infections, pathophysiology, and clinical implications.
9. Genetic and Congenital Disorders (3 hours)	Autosomal and sex-linked disorders, pathogenesis, and clinical features.
10. Systemic Pathology (6 hours)	Cytopathology, environmental pathology (smoking, alcohol, drug abuse), nutritional pathology, physical agents' effects.
11. Practical Laboratory Techniques (2 hours)	Collection, handling, and storage of clinical samples, principles of diagnostic tests.

Practical (60 Hours)

Activity	Description
Microscopy and Slide Preparation (4 hours)	Learn slide preparation, tissue staining, and magnification adjustments for optimal visualization.
Tissue Fixation (4 hours)	Steps of tissue fixation using common fixatives and understanding effects on cellular structure.
Tissue Processing and Staining (6 hours)	Embedding, sectioning, H&E staining for histopathological analysis.
Frozen Section Staining (4 hours)	Rapid intraoperative diagnosis and histopathology using frozen section staining.
Special Stains (PAS, Masson's Trichrome) (5 hours)	Identifying pathological features in tissue samples using special stains.
Immunohistochemistry (5 hours)	Applying antibody markers to identify antigens in tissue samples.
Hemoglobin Levels and Blood Smear (5 hours)	Estimate hemoglobin levels, perform differential blood smear for microscopic examination.
WBC Count and Bleeding/Clotting Time (5 hours)	Perform total/differential WBC counts, measure bleeding and clotting time.
Urine Sample Collection and Analysis (5 hours)	Microscopic and chemical analysis of urine samples for abnormalities.
Blood Grouping and Cross-Matching (4 hours)	Conduct blood grouping and cross-matching for compatibility testing.
Identification of Pathological Changes (5 hours)	Examine tissue samples for degenerative changes like necrosis, gangrene, calcifications.
Cytology Slides Examination (5 hours)	Identify epithelial and mesenchymal tumors using cytopathology principles.
Biochemical Lab Results Interpretation (5 hours)	Interpret liver/kidney function tests and their clinical implications in disease diagnosis.
Sample Handling and Storage (3 hours)	Collect, label, and store clinical samples properly for lab analysis.

Books for Reference:

1. Robbin's Pathologic Basis of Disease
2. Textbook of Pathology by Harsh Mohan
3. Essentials of Pathology by Vinay Kumar

GENERAL MEDICINE

Teaching Methods

- Clinical settings: Students will observe and engage in patient care in outpatient departments, emergency rooms, critical care units, and simulation labs.
- Case discussions: Students will present and discuss real or simulated cases under instructor guidance.
- Role play and simulation: Hands-on practice for history taking, physical examinations, and diagnostic decision-making.
- Multimedia tools: Use of interactive tools, such as case-based scenarios, video lectures, and quizzes.
- Group discussions: Encourage peer-to-peer learning and critical thinking.
- Each student would follow patients (at least one each in the out-patient department, emergency care, and critical care) from the first patient interaction to treatment initiation and follow-up. Students should be able to summarize the case reports and discuss the case in classroom with the discussions moderated by the clinical instructor.

Note: ***Behavioural medicine, public health, ophthalmology, and otorhinolaryngology, dermatology, are covered separately, and therefore not included in this paper.***

BPA 17.GENERAL MEDICINE-I

Goal

To equip students with the knowledge, skills, and behavioural attributes to function effectively as the first point of contact for patient care in clinical settings, enabling them to approach health and illness comprehensively, and make informed clinical decisions.

Learning objectives

By the end of this course, students should be able to:

- Understand the concepts of health and illness, including holistic health.
- Recognize manifestations of infectious and non-infectious diseases.
- Conduct thorough history taking and clinical examinations.
- Correlate clinical symptoms with provisional diagnoses and suggest relevant investigations.
- Interpret investigation results reasonably.
- Present management principles professionally and outline short-term and long-term management plans.
- Manage acute medical emergencies and refer for expert management.
- Conduct family history assessments and determine genetic inheritance modes from pedigrees.
- Recognize the importance of genetic counselling and its ethical implications.
- Understand environmental impacts on health and identify potential health risks.

Pre-requisites

Knowledge of anatomy, physiology, microbiology, pathology, and pharmacology (will be taught concurrently).

Theory (50 Hours)

Topic (Hours)	Description
1. Health and Illness (4 hours)	Understanding health, health disparities, hereditary determinants, biopsychosocial model, patient-centered care, health promotion, ethics, and global health.
2. Common Signs and Symptoms Encountered in Clinical Practice (8 hours)	Discuss common causes of fever, dyspnea, chest pain, headache, cough, abdominal pain, dizziness, weight gain/loss, skin rash, constipation, etc.
3. Systematic Approach to Diagnosis and Management of Diseases (18 hours)	Includes history taking, physical exam, diagnostic testing, differential diagnosis, clinical reasoning, patient involvement, cultural sensitivity, decision-making frameworks, risk assessment, evidence-based medicine, and follow-up.
4. Laboratory Tests (6 hours)	Purpose, reliability, accuracy, and interpretation of lab tests, limitations, common pitfalls, and challenges in resource-limited settings.
5. Nutrition and Nutritional Disorders (8 hours)	Nutritional assessment, dietary patterns, protein energy malnutrition, obesity, vitamin/mineral deficiencies, and the role of nutrition in chronic diseases.
6. Fluid and Electrolyte Imbalance (4 hours)	Clinical correlation and treatment protocols for fluid management in conditions like dehydration and diarrhea.
7. Acid-base Imbalance (3 hours)	Review of biochemistry, interpretation of anion gap, and treatment protocols for acid-base imbalances.

Practical (60 Hours)

Activity (Hours)	Description
1. History Taking (8 hours)	Practice history taking under normal and emergency situations, focusing on cultural sensitivity and patient communication.
2. Physical Examination Skills (10 hours)	Hands-on training on performing general physical exams, measuring vital signs, and understanding physical findings.
3. Diagnostic Skills (5 hours)	Apply theoretical knowledge to formulate differential diagnoses based on clinical history and physical examination.
4. Use of Diagnostic Tests (8 hours)	Learn test selection, calculation of sensitivity/specificity, and interpretation of lab tests; also learn diagnostic strategies in resource-limited settings.
5. Nutrition and Nutritional Disorders (5 hours)	Practice anthropometric assessments, nutritional assessment, and develop dietary plans for malnutrition, obesity, and chronic conditions.
6. Fluid and Electrolyte Imbalance (5 hours)	Practice fluid and electrolyte assessments and management for dehydration, shock, and electrolyte imbalances.
7. Arterial Blood Gas Analysis (5 hours)	Interpret ABG results, identify acid-base imbalances, and practice treatment protocols for metabolic and respiratory disorders.

Books for reference

1. Textbook of Clinical Medicine by Dr. S. S. Purohit, published by Jaypee Brothers Medical Publishers in 2016.
2. Essentials of Medical Physiology by Dr. K. Sembulingam and Dr. Prema Sembulingam, published by Jaypee Brothers Medical Publishers in 2019.

BPA 18.PHARMACOLOGY AND TOXICOLOGY I

Goal:

This course introduces students to the basic principles of pharmacology and toxicology, focusing on the mechanisms of drug action, pharmacokinetics, pharmacodynamics, and the toxic effects of drugs. Students will develop an understanding of the therapeutic uses of drugs, their adverse effects, and the fundamentals of clinical pharmacology.

Learning Objectives:

By the end of the course, students should be able to:

- Understand the basic principles of pharmacology and toxicology.
- Describe the pharmacokinetics of drugs
- Explain pharmacodynamic mechanisms such as receptor binding, signal transduction, and drug-receptor interactions.
- Identify various drug classes and their therapeutic uses.
- Recognize adverse drug reactions, drug toxicity, and drug interactions.
- Understand the toxicity mechanisms and management of poisoning.
- Discuss the clinical implications of pharmacology and toxicology in healthcare settings.

Pre-requisites:

Basic understanding of human physiology and biochemistry.

Theory: 50 hours

Topic and Duration	Content
1. Introduction to Pharmacology and Toxicology (4 hours)	Definition, scope, historical development, basic principles of pharmacology and toxicology, drug regulatory bodies (CDSCO, India).
2. Pharmacokinetics (10 hours)	Absorption, distribution, metabolism, excretion, clinical considerations, drug-drug interactions.
3. Pharmacodynamics (8 hours)	Receptor theory, drug-receptor interactions, dose-response relationship, agonists vs. antagonists, signaling pathways, therapeutic effects and toxicity.
4. General Principles of Drug Action (5 hours)	Mechanism of drug action, therapeutic index, side effects, drug interactions, toxicity.
5. Autonomic Nervous System Pharmacology (8 hours)	Sympathomimetics/sympatholytics, parasympathomimetics/parasympatholytics, clinical applications in hypertension, asthma, glaucoma, and cardiac arrhythmias.
6. Autocoids and Inflammation (5 hours)	Prostaglandins, histamine, leukotrienes, cytokines in inflammation and their clinical uses.
7. Introduction to Toxicology (5 hours)	Principles of toxicology, mechanisms of toxicity, acute vs. chronic toxicity, management of poisoning.
Practical (30 hours)	
1. Drug Absorption, Distribution, and Elimination (12 hours)	Review patient case studies, drug absorption variation, delivery forms, drug-drug interactions, pharmacokinetic parameters interpretation.
2. Blood Pressure and Heart Rate Measurement (6 hours)	Study effects of antihypertensive drugs on blood pressure and heart rate, observation of cardiovascular drug effects.
3. Toxicology Practical: Identifying Drug Toxicity and Management (4 hours)	Identify poisons (e.g., pesticides, heavy metals), simulate case-based poisoning management.
4. General Learning (8 hours)	Analyze medications in patients (pregnant, lactating, ischemic heart disease, elderly, ICU) focusing on pharmacodynamics, pharmacokinetics, interactions, patient advice.

Books for reference

1. "Goodman & Gilman's: The Pharmacological Basis of Therapeutics" by Laurence L. Brunton, Bruce A. Chabner, Bjorn C. Knollmann, Publisher: McGraw-Hill, Year: 2017.
2. "Clinical Pharmacology" by Dr. R.S. Satoskar, Dr. S.D. Bhandarkar, Publisher: Popular Prakashan, Year: 2011.

BPA 19. OPHTHALMOLOGY, ENT & DERMATOLOGY

Goal:

The goal of this course is to enable students to acquire the skills necessary to independently identify and manage common emergencies related to ophthalmic and ENT conditions at primary healthcare settings, assist specialists with non-emergent cases, and recognize and manage common skin, hair, and nail conditions.

Settings and learning methodology:

Students will have clinical rotations in respective outpatient clinics and surgical rooms, primary healthcare centres. Students will learn from through lectures, supervised clinical learnings, simulated case scenarios, case studies etc.,

Learning Outcomes:

By the end of this course, students should be able to:

Ophthalmology:

- Demonstrate proficiency in performing basic eye examination techniques, including visual acuity testing and pupil reactions.
- Independently identify and manage common ophthalmic emergencies, including red eye and eye injuries, under supervision.
- Provide first aid for eye injuries and refer to specialists when necessary.
- Recognize systemic diseases with ocular manifestations and understand their management.

ENT:

- Demonstrate proficiency in basic examination techniques for the ear, nose, throat, and neck.
- Identify and manage common ENT emergencies, such as foreign body aspiration and acute airway obstruction.
- Provide first aid for ENT conditions, including epistaxis and throat emergencies, and refer to specialists as required.
- Recognize systemic causes of ENT disorders and their management.

Dermatology:

- Demonstrate proficiency in performing basic dermatological examination techniques, including skin inspection and palpation.
- Understand preventive skin care measures and the importance of early detection of skin conditions.
- Recognize skin, hair, and nail manifestations of systemic diseases and manage common dermatological issues at the primary care level.
- Provide first aid for allergic reactions and dermatological emergencies.

Theory (50 hours)

Duration & Topic	Subtopics
Ophthalmology (20 hours)	
4 hours: Review of eye structure and functions of the different structures	
4 hours: Elementary Optics and Eye Examination	Basics of visual acuity testing, pupil reactions, and eye movements.
4 hours: Common Ocular Diseases	Conjunctivitis, keratitis, cataracts, glaucoma (types and management).
3 hours: Red Eye and Eye Injuries	Causes and management of red eye, First aid for chemical burns and minor foreign body injuries.
3 hours: Vitreous and Retinal Disorders	Retinal detachment, diabetic retinopathy, and macular degeneration.
3 hours: Systemic Diseases with Ocular Manifestations	Hypertension, diabetes, and other systemic diseases affecting the eyes.
3 hours: Preventive Eye Care	Importance of regular eye exams, eye hygiene, public health awareness.

ENT (20 hours)	
4 hours: Diseases of the Ear	Otitis externa, otitis media (acute and chronic), otomycosis. Management of foreign bodies and ear pain.
4 hours: Diseases of the Nose and Paranasal Sinuses	Rhinosinusitis, allergic rhinitis, epistaxis, nasal polyposis. First aid for epistaxis and foreign body removal.
4 hours: Diseases of the Throat and Larynx	Tonsillitis, pharyngitis, laryngitis, and vocal cord nodules.
3 hours: Systemic Causes of ENT Disorders	Thyroid disorders, autoimmune conditions affecting ENT organs.
3 hours: ENT Emergencies	Foreign body aspiration, acute airway obstruction, and anaphylaxis.
2 hours: Preventive ENT Care	Importance of immunization, hearing screening, and managing occupational hazards.
Skin (10 hours)	
2 hours: History Taking and Dermatological Examination	
3 hours: Common Dermatological Conditions	Acne, eczema, psoriasis, fungal infections, warts, and fungal infections.
2 hours: Skin, Hair, and Nail Manifestations of Systemic Diseases	Dermatological signs of diabetes, lupus, hypertension, and other systemic disorders.
2 hours: Allergic Reactions and Dermatological Emergencies	Contact dermatitis, drug rashes, and allergic reactions (e.g., to hair dye).
1 hour: Preventive Skin Care	Sunscreen use, skin cancer prevention, and managing common skin infections.

Practical (80 hours)

Topic	Content
Ophthalmology Practical Skills (20 hours)	
History Taking and Eye Examination (5 hours)	Perform a focused history for common eye complaints (pain, visual disturbances, discharge). Test visual acuity using Snellen chart. Pupil examination (swinging flashlight test). Test for eye movements and alignment (cover-uncover test).
First Aid for Eye Injuries (5 hours)	Irrigate the eye for chemical burns using saline or water. Assist in minor foreign body removal under supervision.
Assist in Ocular Assessments (5 hours)	Learn how to test colour vision, visual fields, and refraction for spectacle prescription under supervision.
Eye Emergencies (5 hours)	Identify and manage eye injuries such as foreign body removal, chemical burns, etc.
ENT Practical Skills (30 hours)	
History Taking and ENT Examination (5 hours)	Perform focused history for ear, nose, throat, and neck symptoms. Perform head and neck examination, including inspection, palpation, and auscultation.
Ear Examination (5 hours)	Learn to use an otoscope to examine ear canal and tympanic membrane. Assist with ear irrigation for cerumen removal.
Nasal Examination (5 hours)	Use a nasal speculum for nasal cavity inspection. Learn to perform nasal endoscopy under supervision.
Throat and Larynx Examination (5 hours)	Examine oropharynx with a tongue depressor. Assess voice quality and perform laryngeal palpation.
First Aid for ENT Emergencies (5 hours)	Manage epistaxis using anterior nasal packing. Assist with foreign body removal in ear or nose. Provide first aid for throat emergencies (choking or airway obstruction).
ENT Procedures (5 hours)	Perform ENT procedures like ear wax removal or nasal cauterization.
Skin Practical Skills (30 hours)	

History Taking and Dermatological Examination (5 hours)	Perform focused dermatological history (rashes, itching, hair loss). Inspect and palpate skin lesions, identifying conditions like acne, eczema, fungal infections.
Performing Basic Dermatological Procedures (5 hours)	Perform skin scrapings for fungal infections. Do patch testing for allergic reactions (e.g., hair dye).
Basic Wound Care and Dressing (5 hours)	Apply simple dressings to minor burns, cuts, or abrasions. Recognize and manage infections like impetigo or folliculitis.
Skin Biopsy (5 hours)	Assist in skin biopsies for diagnosing conditions like melanoma or suspicious lesions under supervision.
Dermatological Emergencies (5 hours)	Manage allergic reactions, acute rashes, and other dermatological emergencies.

Books for reference

"Parson's Diseases of the Eye," Author: Rohit Shetty, Publisher: Elsevier, Year: 2018

"Textbook of Ear, Nose and Throat Diseases,"Author: P. L. Dhingra, Publisher: Elsevier, Year: 2017

BPA 20. BASICS OF SURGERY

Goals:

The goal of this subject is to equip students with essential knowledge and practical skills in surgical principles, techniques, and patient management. This foundation supports their role in primary care, where they can manage minor surgical conditions, including wound care, suturing, and emergency burn care, within the broader healthcare system. It also prepares them to be valuable assistants in the operating room and post-operative care, laying the groundwork for an advanced role in the next semester.

Learning objectives

At the end of the course, the student should be able to do the following:

- Define surgery and its scope, understand the history and principles of surgery, and differentiate between elective, emergency, minor, and major surgeries.
- Understand wound healing, inflammation, and tissue repair processes, and learn about fluid and electrolyte balance in surgical patients.
- Conduct a preoperative assessment and prepare patients, interpret lab tests and diagnostic tools, and understand informed consent, antibiotic prophylaxis, and HIV/Hepatitis precautions.
- Understand aseptic techniques and sterility, identify and handle basic surgical instruments, set up a sterile field, and use sutures/staples appropriately.
- Master surgical knots, suturing, and drain placement, and learn how to apply bandages and splints.
- Assess anesthesia suitability and understand anesthetic agents, learn anesthetic techniques, monitor anesthesia, manage intraoperative complications, and provide postoperative care, including pain management.
- Understand indications for blood transfusion and potential risks, and learn blood matching and safe transfusion practices.
- Assess nutritional needs and calculate energy requirements, and understand methods of nutrition delivery (oral, enteral, parenteral).
- Monitor and interpret vital signs and hemodynamic parameters, and manage changes in hemodynamics during surgery.
- Understand different types of shock and their management, and learn fluid resuscitation and vasopressor use in shock.

- Classify burns and assess severity, and manage burn wounds, fluid resuscitation, and pain.
- Identify conditions like abscesses, cysts, and lipomas requiring surgery, and understand excision techniques and post-operative care.
- Understand the indications and steps for common surgical procedures (e.g., appendicectomy, prostatectomy, vasectomy), and learn post-operative care and potential complications.

Pre-requisites

Knowledge on human anatomy, physiology, pathophysiology, microbiology, pharmacology, basic biochemistry, basics of nutrition, clinical skills of observation, history taking, and physical assessment.

Theory: 50 hours

Topic	Subtopics
1. Introduction to Surgery and Surgical Practice (2 hours)	- Definition and scope of surgery - History of surgery - Principles of surgery - Types of surgery: elective vs. emergency, minor vs. major
2. Anatomy and Physiology Relevant to Surgery (3 hours)	- Review of human anatomy (abdomen, thoracic, musculoskeletal) - Physiology of wound healing and inflammation - Fluid and electrolyte balance in surgical patients
3. Preoperative Care (4 hours)	- Preoperative assessment and preparation - Laboratory investigations (blood tests, imaging) - Patient education and informed consent - Antibiotic prophylaxis and other preoperative medications - HIV and Hepatitis precautions
4. Sterility, Asepsis, and Surgical Instruments (3 hours)	- Importance of sterility and aseptic techniques - Surgical instruments: types, usage, and handling - Sterile field preparation - Introduction to sutures and stapling devices
5. Basic Surgical Techniques (2 hours)	- Surgical knots and suturing - Placement/removal of drains - Bandages and splints
6. Anesthesia in Surgery (8 hours)	- Preoperative assessment for anesthesia - Anesthetic techniques: general, regional (spinal/epidural) - Anesthesia equipment: machines, monitoring devices - Intraoperative management: vital signs, adjustments - Postoperative care: recovery, pain management - Special considerations: pediatric, obstetric, robotic/laser surgeries
7. Blood Transfusion: Indications and Hazards (2 hours)	- Indications for blood transfusion - Potential hazards and management
8. Nutrition in Surgical Patients (4 hours)	- Assessment of nutritional status - Energy requirements and delivery modes - Enteral and parenteral nutrition options
9. Hemodynamic Monitoring During Surgery (3 hours)	- Methods of hemodynamic monitoring - Interpreting vital signs and managing changes during surgery

10. Shock and Management of Shock (2 hours)	- Types of shock: hypovolemic, cardiogenic, septic, etc. - Management protocols and early recognition
11. Common Skin and Subcutaneous Conditions Requiring Surgery (3 hours)	- Types of conditions (e.g., abscesses, cysts, lipomas) - Surgical indications and management
12. Burns (3 hours)	- Types of burns: first, second, third degree - Assessment and classification - Burn management: initial care, fluid resuscitation, wound treatment
13. Common Surgical Procedures: Indications and Steps (8 hours)	- Appendicectomy - Circumcision - Lithotripsy - Prostate biopsy and prostatectomy - Renal biopsy - Vasectomy
Practical: 40 hours	
1. Basic Surgical Skills (6 hours)	- Surgical knots - Suturing techniques - Placement and removal of drains - Bandages and splints Hands-on training with suture pads and artificial models. Practice tying knots and suturing on simulated tissue and application of bandages and splints in different clinical scenarios.
2. Aseptic Technique and Sterility (4 hours)	- Preparation of sterile field: Proper sterilization techniques, draping, and maintaining a sterile environment. - Learn correct usage and handling of surgical instruments (scalpels, forceps, scissors, needle holders, etc.) - Practice instrument handling in a controlled environment. - Learn how to maintain sterility in simulated surgical scenarios where students maintain sterility. -

Topic	Subtopics
	Learn sterilization processes (autoclaving, chemical sterilization) and personal protective equipment (PPE) management.
3. Patient Preoperative Assessment (4 hours)	- Conducting patient interviews and performing physical examinations. - Reviewing and interpreting diagnostic reports (e.g., blood work, imaging). - Role-play scenarios to practice obtaining informed consent.
4. Anesthesia Techniques and Monitoring (6 hours)	- Hands-on practice with administering local anesthesia - Familiarization with anesthesia machines and monitoring equipment. - Simulated anesthetic induction, maintenance, and recovery phases. - Observe induction, maintenance, and recovery phases in a real setting of surgery.
5. Blood Transfusion Procedures (4 hours)	- Simulated blood transfusion setup and administration. - Monitoring of patients during transfusions, observing for signs of transfusion reactions. - Discussion and case studies on transfusion indications and complications.
6. Management of Shock and Hemodynamic Monitoring (4 hours)	- Simulated shock scenarios, where students use monitoring devices and manage resuscitation. - Observe fluid management, medication administration, and monitoring in shock cases.
7. Management of Burns (4 hours)	- Practice burn assessment using burn charts and classification systems. - Simulated burn wound care with the application of dressings. - Practice fluid resuscitation.
8. Common Surgical Procedures (8 hours)	- Observe real surgeries in the operating theatre - Help with basic tasks (sterile field prep, passing instruments, monitoring patients) - Engage in basic postoperative monitoring and wound management.

Books for reference

1. General Surgery: A Competency-Based Approach by Dr. S. P. Bansal – Publisher: Elsevier, Year: 2019
2. Textbook of Surgery by Dr. P. S. Ramachandran – Publisher: Jaypee Brothers Medical Publishers, Year: 2017
3. The Essentials of General Surgery by Peter F. Lawrence – Publisher: Lippincott Williams & Wilkins, Year: 2003

BPA 21. COMMUNITY MEDICINE-III

Goals

The goal of this course is to equip students with foundational knowledge and skills in epidemiology and community health assessment, preparing them to identify and address public health issues in communities.

Learning Methodology and Settings:

The course will combine lectures, case studies, group discussions, field visits, and hands-on activities to provide both theoretical knowledge and practical skills. Students will engage with local communities and health centers to observe real-world health issues and practice epidemiological data collection and analysis. Online resources, interactive sessions, and multimedia will be integrated to enhance learning.

Learning Objectives:

Upon completion of this course, students will be able to:

- Understand Epidemiological Study Designs
- Measure and Interpret Risks in Epidemiology
- Identify and Manage Bias and Confounding
- Conduct Community Health Assessments
- Design Action Plans for Health Improvement
- Apply Public Health Knowledge in Real-World Settings

Theory 20 hours

Theory (20 hours)	Topics	Content
1. Study Designs in Epidemiology (4 hours)	Cross-sectional Study	Overview of study design; snapshot of a population at one point in time
	Cohort Study	Study following a group over time to assess health outcomes
	Case-Control Study	Comparing individuals with a condition to those without
	Randomized Controlled Trials (RCT)	Experimental study with random assignment of participants
2. Measuring risk in epidemiology (4 hours)	Definition	Understanding risk measures
	Measures of association	How different measures like Relative Risk, Odds Ratio, Attributable Risk, and Population Attributable Risk are used to calculate associations between exposure and outcomes
3. Bias and Confounding (4 hours)	Bias	Understanding types of biases (selection, information, etc.) that may affect study results
	Confounding	How confounding variables can distort the perceived relationship between exposure and outcome
4. Introduction to Community Health Assessment (4 hours)	What is community health assessment?	Definition and importance of assessing health needs at the community level

Theory (20 hours)	Topics	Content
	Why is community health assessment needed?	Importance of data in guiding health interventions
	Concepts and factors to consider	Systematic data collection, community engagement, identification of health disparities, multisector
		collaborations, evidence-based interventions, continuous improvement, and planning
5. Community Health Assessment Methodology (4 hours)	Preparation and Planning	Steps involved in planning a community health assessment
	Community Engagement	Involving the community in the assessment process
	Data Collection	Methods for gathering health-related data from community members
	Data Analysis	How to interpret and analyze collected data
	Health Prioritization	Identifying the most pressing health issues in the community
	Health Profile Development	Creating a comprehensive health profile for the community
	Health Status Indicators	Using specific indicators like mortality rates, morbidity, and others to assess community health

	Key Determinants of Health	Identifying social, economic, and environmental factors that impact health
	Resource and Asset Mapping	Mapping resources, services, and strengths within the community
	Health Disparities	Addressing inequities in health outcomes
	Action Plan Development	Creating a detailed plan of action for addressing health issues
	Implementation and Monitoring	Carrying out the plan and tracking progress
	Reporting and Dissemination	Preparing reports and sharing findings with stakeholders

Practical (30 hours)

1. Field Visit to Primary Health Centres and Community Engagement (6 hours)	Observation of health issues in the community	Visiting PHC, observing health issues, and interacting with health workers and residents
2. Data Collection and Analysis (6 hours)	Gathering and analyzing health data	Conducting surveys or interviews, analyzing data to identify health risks
3. Risk Assessment and Prioritization (6 hours)	Identifying and prioritizing health issues	Using tools to assess and rank health risks in the community
4. Creating a Community Health Profile (6 hours)	Developing a health profile	Summarizing key health issues, resources, and challenges
5. Developing an Action Plan (6 hours)	Creating an action plan	Developing steps and strategies to address identified health problems
6. Reporting and Presentation (3 hours)	Preparing and presenting a report	Writing a simple report and presenting findings with proposed actions for improving community health

YEAR II-SEMESTER IV

BPA 22. GENERAL MEDICINE II

Goal:

To build upon the foundational knowledge and skills acquired in Semester III, enabling the students to manage and assist in the management of a broad range of medical conditions in both acute and chronic settings.

Learning Objectives:

By the end of this course, students should be able to:

- Demonstrate a systematic approach to diagnosis and management in a wide variety of medical conditions, including chronic diseases.
- Apply clinical reasoning to interpret complex cases and select appropriate diagnostic and therapeutic interventions.
- Manage common medical emergencies in a timely and evidence-based manner.
- Understand the principles of organ-specific management (cardiology, respiratory, gastrointestinal, endocrine, etc.) and provide holistic patient care.
- Recognize the ethical and cultural issues in medical management.
- Assist in multi-disciplinary team care for complex patients, including providing patient education and support for long-term management.

Theory: 50 Hours

Topic	Subtopics	Details
1. Cardiovascular Disorders (10 hours)	Basic Principles	Understanding heart anatomy, physiology, and pathophysiology
	Common Conditions	Hypertension, coronary artery disease, heart failure, arrhythmias
	Clinical Evaluation	History and physical examination for cardiovascular conditions
	Diagnostic Tests	ECG, echocardiography, stress testing, blood tests
	Management Strategies	Pharmacological management, lifestyle modifications, catheter-based interventions, surgical interventions
	Chronic Disease Management	Long-term management of hypertension, coronary artery disease, and heart failure
2. Respiratory Disorders (8 hours)	Basic Respiratory Physiology	Pulmonary function and gas exchange
	Common Respiratory Diseases	Asthma, COPD, pneumonia, tuberculosis, interstitial lung disease
	Diagnostic Approaches	Pulmonary function tests, chest X-ray, CT scan, arterial blood gases
	Management Protocols	Pharmacological treatment, oxygen therapy, mechanical ventilation
	Acute Emergencies	Acute exacerbations of asthma, COPD, pneumonia

Topic	Subtopics	Details
3. Gastrointestinal Disorders (8 hours)	Basic Gastrointestinal Physiology	Digestion, absorption, motility
	Common GI Disorders	Peptic ulcer disease, inflammatory bowel disease, irritable bowel syndrome, liver cirrhosis, pancreatitis, gall bladder stones
	Clinical Evaluation	Abdominal examination, stool analysis, endoscopy, liver function tests
	Management	Pharmacological treatment, nutritional support, surgery
	Chronic Disease Management	Long-term care for chronic liver disease, inflammatory bowel disease, gastrointestinal cancers
4. Renal and Urological Disorders (6 hours)	Renal Physiology	Glomerular filtration, renal tubular function
	Common Conditions	Acute and chronic kidney disease, nephrotic syndrome, renal failure, urinary tract infections, kidney stones
	Clinical Diagnosis	Urine analysis, renal function tests, imaging studies
	Management	Dialysis, diuretics, antibiotics, kidney transplantation
	Acute Management	Hyperkalemia, renal failure, electrolyte imbalances
5. Endocrine Disorders (6 hours)	Basic Endocrine Physiology	Hormone regulation and feedback systems
	Common Endocrine Diseases	Diabetes mellitus, thyroid disorders, adrenal insufficiency, pituitary disorders
	Diagnostic Approaches	Blood glucose, thyroid function tests, imaging of endocrine glands

	Management	Insulin therapy, thyroid hormone replacement, corticosteroid therapy
	Chronic Disease Management	Diabetes and thyroid disorder management, prevention of complications
6. Neurological Disorders (6 hours)	Basic Neurophysiology	Central nervous system structure, function, pathophysiology
	Common Neurological Conditions	Stroke, epilepsy, Parkinson‘s disease, multiple sclerosis, headache syndromes
	Clinical Examination	Neurological assessment, cranial nerve examination, Glasgow Coma Scale
	Diagnostic Testing	CT scan, MRI, lumbar puncture, EEG
	Management	Pharmacological treatment, physical therapy, rehabilitation strategies
7. Hematological Disorders (4 hours)	Basic Hematology	Blood cell production, clotting, immune response, role of lymph nodes, spleen, and lymphatic system in cancer metastasis
	Common Hematologic Diseases	Anemia, leukemias, lymphomas, clotting disorders
	Diagnostic Approach	Complete Blood Count, bone marrow biopsy, coagulation studies
	Management	Blood transfusions, iron therapy, chemotherapy, anticoagulants
8. Infectious Diseases (2 hours)	Principles of Infection Control	Prevention, vaccination, antimicrobial stewardship
	Common Infections	Tuberculosis, HIV/AIDS, sepsis, viral hepatitis, influenza
	Diagnostic Approach	Cultures, PCR, serology
	Treatment Protocols	Antibiotics, antivirals, antifungals, vaccines
	Emergent Infections	Sepsis management, septic shock management, lymphatic system in infection and immunity

Practical (60 hours)

Topic	Details
1. History Taking and Physical Examination (12 hours)	Refine history taking and physical examination with emphasis on cardiovascular, respiratory, GI, renal, and endocrine disorders. Learn to examine lymph nodes.
2. Clinical Decision-Making and Diagnostic Skills (12 hours)	Develop differential diagnoses using clinical reasoning frameworks; select and interpret diagnostic tests (ECG, X-ray, blood tests). Formulate management plans based on findings.
3. Management of Common Medical Emergencies (8 hours)	Responding to acute emergencies (Asthma Attacks, Strokes, Sepsis, Cardiac Arrest, Diabetic Ketoacidosis); administer emergency medications, practice basic life support and advanced cardiac life support in simulated settings.
4. Interpreting and Managing Lab Results (8 hours)	Practice interpreting common laboratory tests (CBC, liver function tests, renal function tests, ABG). Use results to guide clinical decisions.
5. Pharmacological Management (8 hours)	Understand drug dosages, indications, contraindications, side effects; practice prescribing medications for common conditions. Learn adjustments based on comorbidities.
6. Chronic Disease Management and Preventive Medicine (6 hours)	Develop long-term management plans for chronic diseases (diabetes, hypertension, COPD). Learn to counsel on lifestyle changes, medication adherence, and prevention.
7. Patient Education and Communication Skills (4 hours)	Learn how to counsel patients on diagnoses, treatments, preventive strategies; address cultural and ethical issues in patient care.

BPA 23. ADVANCED SURGERY

Goal:

To deepen the understanding of surgical principles, enhance clinical skills, and foster critical thinking for Physician Associate students. This course focuses on advanced surgical knowledge, skills, and patient management in diverse surgical specialties.

Learning Objectives:

- Gain knowledge of the pathophysiology of surgical diseases, surgical anatomy, and physiology.
- Understand and apply principles of wound healing, infection control, hemostasis, and blood transfusion.
- Develop advanced clinical skills including assisting in complex surgeries, performing clinical assessments, and managing postoperative complications.
- Enhance decision-making abilities by analyzing patient data and identifying surgical risks.
- Improve communication and teamwork within the surgical team.

Theory: 70 Hours

Topic	Content
1. Gastrointestinal Surgery (9 Hours)	Esophagus: Esophageal cancer, Achalasia, Hiatal hernia, Esophageal varices, Zenker diverticulum
	Stomach: Peptic ulcer disease, Gastric cancer, Gastric polyps, Gastric outlet obstruction, Gastrectomy
	Small Intestine: Crohn disease, Ulcerative colitis, Small bowel obstruction
	Colon & Rectum: Diverticular disease, Appendicitis, Colon cancer, Rectal cancer, Inflammatory bowel disease, Hemorrhoids, Anal fissures
	Liver: Cirrhosis, Hepatocellular carcinoma, Liver transplantation
	Pancreas: Pancreatitis, Pancreatic cancer, Whipple procedure
	Biliary Tract: Cholelithiasis, Cholecystitis, Choledocholithiasis, Laparoscopic cholecystectomy
2. Cardiovascular Surgery (8 Hours)	Aortic Surgery: Aneurysms (abdominal & thoracic), Aortic dissection
	Peripheral Vascular Surgery: Atherosclerosis, Peripheral arterial occlusive disease, Lower extremity revascularization, Venous diseases (DVT, varicose veins)
	Cardiac Surgery: Coronary artery bypass grafting (CABG), Valve replacement, Cardiac transplantation
3. Thoracic Surgery (6 Hours)	Lung Cancer: NSCLC, SCLC, Lung metastases, Thoracic trauma, Pneumothorax, Lung abscess
	Mediastinal Tumors: Diagnosis, treatment approaches
4. Neurosurgery (8 Hours)	Cranial Trauma: Concussion, contusion, subdural hematoma, skull fractures
	Intracranial Tumors: Gliomas, meningiomas, pituitary tumors
	Spinal Disorders: Spinal cord injury, stenosis, herniated discs, spinal tumors

5. Urology (8 Hours)	Kidney: Renal cell carcinoma, Wilms tumor, Renal stones, Nephrectomy
	Ureter: Ureteral stones, strictures
	Bladder: Bladder cancer, Interstitial cystitis, Neurogenic bladder, Cystolithiasis
	Prostate: BPH, Prostate cancer, TURP
	Testes & Penis: Testicular cancer, Testicular torsion, Peyronie disease, Penile cancer
6. Endocrine Surgery (8 Hours)	Thyroid: Thyroid cancer, Hyperthyroidism, Thyroidectomy
	Parathyroid: Hyperparathyroidism
	Adrenal Glands: Pheochromocytoma, Cushing syndrome, Adrenal insufficiency
7. Trauma Surgery (5 Hours)	Blunt Trauma: Abdominal, chest, head, extremity trauma
	Penetrating Trauma: Gunshot wounds, stab wounds, damage control surgery
8. Surgical Oncology (7 Hours)	Principles of Cancer Surgery: Tumor biology, surgical margins, adjuvant therapy
	Common Cancers: Breast, colorectal, lung, pancreatic, gastric, head & neck, genitourinary cancers
9. Pediatric Surgery (7 Hours)	Congenital Anomalies: Cleft lip/palate, Hirschsprung disease, Childhood tumors

Practical (60 Hours)

Topic	Details
Core Surgical Skills	Continuous development of aseptic technique, instrument handling, suturing & knot tying, hemostasis, tissue handling, and wound closure.
Clinical Skills	Preoperative assessment, intraoperative assistance, postoperative care, clinical documentation.
Advanced Surgical Skills	Minimally invasive surgery, surgical oncology, trauma surgery, pediatric surgery, GI surgery, breast surgery, vascular surgery.
Postoperative Management	Managing postoperative complications such as infections, bleeding, pain management, and wound care.
Independent Procedures	Minor procedures such as incision and drainage, simple wound closures, foreign body removal under local anesthesia.
Advanced Techniques (Assisting)	Assisting with trauma & damage control surgery, vascular surgery (angioplasties, stents), laparoscopic surgery.

BPA 24. PHARMACOLOGY AND TOXICOLOGY II

Goal:

This course builds on the knowledge gained in Pharmacology I, focusing on advanced pharmacological principles, clinical pharmacology, and the toxicology of specific drug classes. Students will also gain a deeper understanding of pharmacological management of diseases, the toxicity of drugs, and pharmacovigilance.

Learning Objectives:

By the end of the course, students should be able to:

- Describe advanced mechanisms of drug action in various body systems.
- Understand the clinical pharmacology of drugs used in treating specific diseases (e.g., cardiovascular, CNS, antimicrobial agents).
- Identify drug interactions, side effects, and mechanisms of drug resistance.
- Understand the toxicology of drug overdose, including specific antidotes and treatment strategies.
- Apply clinical pharmacology in therapeutic drug management.
- Understand principles of pharmacovigilance and the prevention of drug toxicity.
- Understand the recent advancements in drug interventions

Pre-requisites:

Successful completion of Pharmacology I.

Theory: 40 hours

Topic	Subtopics
1. Central Nervous System Pharmacology (8 Hours)	• Sedative-hypnotic drugs: Benzodiazepines, barbiturates, and their mechanism of action.
	• Antidepressants and Antipsychotics: SSRIs, tricyclics, antipsychotic agents (dopamine antagonists).
	• Anticonvulsants: Mechanisms of action of common drugs used in epilepsy management.
	• Analgesics: Opioids, NSAIDs, and their effects on pain pathways.
	• CNS stimulants: Mechanisms of caffeine, amphetamines, and their therapeutic use.
2. Cardiovascular Pharmacology (8 Hours)	• Anti-hypertensive drugs: Mechanisms of action of ACE inhibitors, ARBs, calcium channel blockers.
	• Anti-arrhythmic drugs: Class I-IV antiarrhythmic drugs.
	• Anti-coagulants and anti-platelet drugs: Mechanism of warfarin, heparin, aspirin.
	• Congestive heart failure management: Use of diuretics, vasodilators, and inotropic agents.
3. Antimicrobial Pharmacology (6 Hours)	• Antibiotics: Mechanisms of action, resistance, and side effects of various classes (penicillins, cephalosporins, quinolones, tetracyclines).
	• Antifungal agents: Mechanisms and therapeutic use.
	• Antiviral drugs: Mechanisms of action and clinical applications (e.g., antiretrovirals, antivirals for hepatitis).
	• Antiparasitic drugs: Drugs used in the treatment of malaria, helminthiasis, and protozoal infections.

4. Chemotherapy and Toxicology (8 Hours)	• Chemotherapeutic agents: Mechanisms of action, clinical applications, and resistance (e.g., cytotoxic drugs).
	• Drug-induced toxicity: Cytotoxicity, carcinogenicity, teratogenicity.
	• Organ-specific toxicity: Hepatic, renal, and neurological toxicities associated with chemotherapy.
	• Drug overdose management: Antidotes for common toxic drug overdoses.
5. Pharmacovigilance and Drug Safety (8 Hours)	• Pharmacovigilance: Reporting adverse drug reactions (ADRs), role of WHO in global monitoring.
	• Clinical trials: Phase I-IV, ethics, and safety protocols.
	• Drug interactions: Identifying and managing drug-drug interactions in clinical practice, polypharmacy.
	• Herbal and alternative medicines: Safety, efficacy, and regulatory challenges.
6. Advances in Pharmacology (2 Hours)	• Personalized and Precision Medicine
	• Biologics and Biopharmaceuticals
	• Immunotherapy
	• mRNA Technology
	• Artificial Intelligence (AI) in Drug Discovery
	• Stem Cell Therapy
	• Drug Repurposing
	• Microbiome-Based Therapies
	• Advanced Drug Delivery Systems
	• CRISPR and Gene Editing
	• Sustainable and Green Chemistry

Practical: 30 Hours

Topic	Content
1. CNS Drug Effects (4 Hours)	• Review and analyze case studies involving CNS drug effects (e.g., CNS depressants, antidepressants, opioids).
	• Discuss the clinical implications of these drugs on behavior, mental status, and patient care.
	Settings: inpatient wards, or mental health settings.
2. Cardiovascular Drug Effects (4 Hours)	• Study patient case scenarios involving antihypertensive agents, anti- arrhythmic drugs, and diuretics.
	• Identify the effects of these drugs on blood pressure, heart rate, and cardiac rhythm, and discuss their role in clinical management.
	Settings: Primary care, cardiology clinics, or inpatient care settings.
3. Antibiotic Sensitivity and Management (4 Hours)	• Analyze case studies of bacterial infections and antibiotic therapies.
	• Discuss strategies for selecting appropriate antibiotics based on sensitivity testing and patient factors (e.g., allergies, renal function).
	Settings: outpatient department or hospital wards.
4. Polypharmacy Evaluation and Management (6 Hours)	• Review patient case studies with multiple chronic conditions to identify polypharmacy issues.
	• Evaluate the risks of drug-drug interactions, inappropriate prescribing, and adverse effects in patients. Propose adjustments to optimize medication regimens.
	• **Setting**: Primary care clinics, geriatric care units, or outpatient consultations.
5. Pharmacovigilance and ADR Reporting (4 Hours)	• Analyze real-world case studies involving adverse drug reactions (ADRs) and drug interactions.
	• Simulate ADR management scenarios and participate in a pharmacovigilance reporting exercise to monitor and report drug safety concerns.
	Settings: Hospital settings, clinical pharmacology units, or outpatient departments.

6. Toxicology and Overdose Management (4 Hours)	• Review and discuss case studies of drug overdoses and toxicological emergencies.
	• Discuss management strategies for poisoning, including the use of antidotes, supportive care, and clinical monitoring.
	Setting: Emergency departments
7. Drug-Drug Interaction Case Studies (4 Hours)	• Evaluate patient scenarios with polypharmacy to identify potential drug- drug interactions.
	• Discuss the clinical significance of these interactions and strategies to minimize risks.
	Setting: Primary care settings, hospital outpatient clinics, or multidisciplinary care teams.
	• Practice pharmacological counselling on patients with chronic diseases.

BPA 25. PSYCHOLOGY AND INTRODUCTION TO BEHAVIOURAL MEDICINE

The course uses a blend of lectures, workshops, case studies, and clinical simulations, with hands-on practice in skills labs and clinical placements in settings like primary care clinics and mental health services. Students will engage in group work, role-playing, and online learning to apply theory to practice.

Goal:

This course introduces students to the foundational concepts of behavioral medicine, highlighting the role of psychological, social, and biological factors in health and disease. It aims to help students understand how behavioral and emotional aspects influence patient care, treatment adherence, and health outcomes. The course will also explore strategies and interventions to promote wellness.

Learning Objectives:

By the end of the course, students should be able to:

- Define behavioral medicine and its connection to health and illness.
- Recognize psychosocial factors (e.g., stress, coping) that influence health.
- Understand the impact of psychological and social factors on chronic diseases like hypertension and diabetes.
- Apply the biopsychosocial model in clinical practice.
- Identify and manage psychosomatic disorders.
- Develop skills in patient communication, motivational interviewing, and behavioral interventions.
- Understand the importance of psychological screening in clinical settings.

Pre-requisites:

Basic understanding of human physiology, and clinical medicine.

Theory 40 hours

Topic	Content
1. Introduction to Psychology and Behavioral Medicine (4 Hours)	Overview of psychology and behavioral medicine in health.
	• The biopsychosocial model: integrating biological, psychological, and social factors.
2. Psychological and Social Factors in Health (8 Hours)	• Role of stress, emotions, and coping in health.
	• Impact of psychological stress on physical health (e.g., heart disease, diabetes).
	• Social determinants of health: poverty, family, and community influences.
	• Psychological theories of behavior change (e.g., cognitive- behavioral, stress management).
3. The Biopsychosocial Model in Medicine (6 Hours)	• Definition and key principles of the biopsychosocial model.
	• Historical development and evolution of the biopsychosocial model.
	• How the biopsychosocial model differs from the biomedical model.
	• Importance of integrating biological, psychological, and social factors in healthcare.
	• The interaction of biological, psychological, and social factors with health and disease.
	• Integrating psychological theories into medical practice.
4. Behavioral Interventions in Healthcare (4 Hours)	• Health behavior change
	• Cognitive behavioral therapy
	• Motivational interviewing
	• Health education & counselling
	• Behavioral activation
	• Contingency management
	• Stress reduction techniques
	• Social & environmental support
	• Psychoeducation for caregivers

5. Psychosomatic Disorders and Mental Health (6 Hours)	• Understanding psychosomatic disorders: the mind-body connection.
	• Diagnosis and management of mental health influences on physical health (e.g., IBS, fibromyalgia).
	• Behavioral interventions in psychosomatic conditions.
	• Psychological factors in pain perception and management.
6. Behavioral Medicine in Chronic Disease Management (6 Hours)	• Applying behavioral medicine to manage chronic diseases (e.g., hypertension, diabetes).
	• Psychological support and interventions to enhance treatment adherence.
	• Communication strategies and family therapy in chronic illness care.
	• Addressing mental health in patients with chronic conditions.
7. Stress Management and Health Promotion (4 Hours)	• Psychological techniques for stress reduction (e.g., relaxation, deep breathing).
	• The role of physical activity, nutrition, and sleep hygiene in promoting health.
	• Health promotion strategies: preventive health behaviors. • Psychological principles in wellness and mind-body approaches (e.g., yoga, meditation).
8. Psychological Screening and Patient Communication (6 Hours)	• Psychological screening in routine clinical practice.
	• Identifying patients at risk for mental health issues (e.g., anxiety, depression).
	• Effective communication strategies: handling difficult patients, fostering trust.
	• Behavioral and emotional management in patient care.

Practical: 30 Hours

Topic	Activities
1. Psychosocial Assessment Tools (4 Hours)	• Understand and apply key psychosocial assessment tools (e.g., stress scales, depression inventories).
	• Overview of psychosocial assessment tools used in clinical practice.
	• Gain experience with stress scales, depression inventories, and other tools through supervised hands-on experience.
	• Analyze results, interpret findings, and explore their clinical implications for patient care.
2. Communication Skills and Motivational Interviewing (4 Hours)	• Learn the core principles and techniques in motivational interviewing (e.g., open-ended questions, reflective listening).
	• Practice motivational interviewing and active listening with fellow students in simulated clinical scenarios.
	• Conduct role-plays to refine communication techniques, focusing on empathy, trust-building, and non-verbal cues.
3. Behavioral Interventions for Stress Management (4 Hours)	• Relaxation Techniques-Practice progressive muscle relaxation, deep breathing, and guided imagery.
	• Mindfulness and Biofeedback: Use mindfulness exercises and biofeedback tools to manage stress.
	• Stress Management: Discuss how to integrate these techniques into comprehensive patient care plans.
4. Case Studies in Psychosomatic Disorders (4 Hours)	• Case study analysis: Review real-world case studies of psychosomatic disorders.
	• Treatment plan development: Develop comprehensive care plans that incorporate behavioral interventions.
	• Role-playing diagnosis and Intervention: practice diagnosis and intervention strategies through role-playing exercises.

5. Practical Application of the Biopsychosocial Model (4 Hours)	• Work in groups to analyze case studies, identifying biological, psychological, and social factors in patient health.
	• Develop holistic, patient-centered treatment plans based on the biopsychosocial model.
	• Conduct mock interviews to explore psychosocial factors impacting patient care, integrating findings into treatment strategies.
6. Behavioral Medicine in Chronic Disease (4 Hours)	• Conduct mock interviews and patient interviews focusing on psychosocial aspects of chronic disease management.
	• Use motivational interviewing techniques to encourage adherence to treatment plans.
	• Discuss psychosocial strategies for managing chronic disease, including family involvement, stress management, and lifestyle changes.
7. Stress and Health Promotion Workshop (3 Hours)	• Promote healthy behaviors (exercise, nutrition, and smoking cessation) in patients.
	• Practice delivering stress management techniques, including relaxation and mindfulness exercises.
	• Engage in interactive activities, such as role- playing to teach patients how to manage stress and adopt healthier habits.
8. Psychological Screening for Mental Health (5 Hours)	• Learn and practice psychological assessments (e.g., anxiety, depression inventories).
	• Engage in role-play scenarios to practice discussing mental health concerns and treatment options with patients.
	• Learn how to refer patients to mental health professionals and integrate psychological assessments into comprehensive treatment plans.

Books for reference

1. Introduction to Clinical Psychology: An Evidence-Based Practice Perspective by Geoffrey P. Kramer, Douglas A. Bernstein, and Vicky Phares
2. Behavioral Medicine: A Handbook for Psychologists, Editor: Jerry M. Suls and Richard L. Wallston

BPA 26. MEDICAL COMMUNICATION

Rationale and goals:

Effective communication in medicine is vital for patient safety, treatment success, and fostering a positive patient-care provider relationship. Poor communication can jeopardize patient safety and lead to misunderstandings, delayed treatments, or even adverse outcomes. This course equips students with the necessary communication skills, focusing on both verbal and non-verbal techniques, written documentation, and communication during emergencies. The course also emphasizes professional behaviour, patient counselling, and medical ethics to ensure a holistic approach to communication in healthcare settings.

Settings and learning methodologies:

Interactive lectures and discussions will lay the foundation for theory. Role-playing, case simulations, and peer reviews will be used to refine practical communication skills.Supervised clinical exposure will help students apply theory to real-world healthcare communication challenges.

Learning Outcomes:

By the end of this course, PA students should be able to:

- Understand and apply the principles of effective communication with patients, families, and healthcare teams.
- Demonstrate proficiency in oral and written medical communication.
- Manage difficult communication scenarios such as breaking bad news or dealing with non-compliant patients.
- Write medical reports, case histories, surgical notes, discharge summaries, and other essential documentation effectively.
- Utilize communication technologies (e.g., emails, telemedicine, and language interpreters) to ensure clarity and inclusivity.

Theory: 30 Hours

Topic & Hours	Content
Introduction to Medical Communication (4 hours)	- Importance of communication in healthcare. - Types of communication: verbal, non-verbal, and written. - Key qualities of effective communication: Clarity, empathy, active listening, and assertiveness. - Identifying barriers to communication: Language barriers, emotional states, cultural differences, environmental factors, and technological issues.
Communication with Patients (6 hours)	- Building rapport and trust with patients. - History-taking techniques: Open-ended questions, active listening, and empathy. - Patient education: Explaining medical conditions, treatment plans, medications, and procedures clearly and in a patient- friendly manner. - Respecting patient autonomy and addressing patient concerns. - Using language interpreters: Bridging communication gaps in multilingual contexts. - Communicating through email and other digital tools.
Ethics, Etiquette, and Professional Behavior (4 hours)	- Medical ethics in communication: Confidentiality, consent, and professionalism. - Patient respect: Maintaining dignity, cultural sensitivity, and avoiding judgment. - Professional etiquette: Proper conduct in patient interactions, maintaining a compassionate and respectful demeanor, managing time efficiently. - Non-verbal communication: Body language, eye contact, and tone of voice in building rapport.
Managing Difficult Communications (5 hours)	- Gender and age issues: Adapting communication strategies based on patient demographics. - Approaching sensitive topics such as sexual health history, mental health, and other personal matters with respect. - Breaking bad news: Techniques to deliver unpleasant diagnoses, such as terminal illness, in a compassionate yet clear manner. - Dealing with difficult patients: Addressing emotional, angry, or non-compliant behaviour. - Conflict resolution: Managing disagreements between patients and the healthcare team.

Communication within the Medical and Non- Medical Teams (4 hours)	- Team communication: Clear, concise, and professional communication with doctors, nurses, and allied health professionals. - Interdisciplinary collaboration: Ensuring effective communication between clinical teams, administrative staff, and non-medical professionals. - Reporting and handover techniques: Communicating patient status during shift changes, emergency situations, or transfers.
Presenting Cases and Written Communication (5 hours)	- Presenting a case: Key components of a medical case presentation, including history, examination, differential diagnosis, and management plan. - Written communication: Writing clear and concise medical documentation for clinical settings, medical records, and patient follow-up. - Telephonic communication: Effective communication in telemedicine, phone consultations, and emergency calls. - Communicating during emergency situations: Keeping calm and clear under pressure, triaging information quickly.
Medical Documentation and Reports (6 hours)	- Writing medical reports: The purpose and structure of medical reports. - Case history and presentation: Recording medical histories, presenting patient conditions, and communicating interpretation of tests. - Writing orders: Clear and actionable medical orders (e.g., lab tests, treatments, medication). - Recording progress: Documenting patient progress and response to treatment, and preparing case summaries. - Writing surgical notes, discharge summaries, death summaries, and referral letters: Essential components and dos and don‘ts for each.

Practical (40 hours)

Topics	Activities
Oral Communication in Various Scenarios (20 hours)	- Practice history taking in medical scenarios through role plays: History-taking, delivering patient education, and explaining diagnoses and treatment options. - Communicate with patients from diverse backgrounds: Adapting language, tone, and approach based on age, culture, and language. - Practice in simulated case scenarios on how to handle difficult communication scenarios: Breaking bad news, addressing a patient's emotional responses, and managing non-compliant patients. Observe how this is done in real-world settings, and critically evaluate how it is done. - Practice communication with the medical team: Presenting cases, discussing patient progress, and conveying urgent information.
Written Communication Exercises (12 hours)	- Write medical case reports: Drafting history-taking notes, presenting clinical findings, and formulating differential diagnoses and treatment plans. - Write discharge summaries and surgical notes: Structure, clarity, and concise documentation. - Compose referral letters, death summaries, and progress notes: Essential components and dos and don'ts. - Telemedicine practice: Practice drafting clear and professional emails and messages to patients or other medical professionals.
Communication during Emergency Situations (8 hours)	- Learn and practice communication - both verbal and written during simulated emergency situations (e.g., trauma, cardiac arrest, critical care). - Learn communicating with the treating physician. - Learn communicating with healthcare teams. - Learn communicating with patients and attenders.

Books for reference

The Medical Interview: Mastering Skills for Clinical Practice" **by** John L. Coulehan **and** Marcia W. Block

BPA 27. COMMUNITY MEDICINE AND CLINICAL RESEARCH-I

Goals

This course will equip students with essential public health and clinical research knowledge. They will learn epidemiological principles, outbreak investigation methods, and screening practices, along with the design and evaluation of clinical research studies. Students will develop the skills to apply evidence-based practices and research methodologies in real-world public health and clinical settings.

Learning methodologies and settings

Students will engage in both theoretical learning and hands-on applications, using real-world scenarios to better understand epidemiological principles, clinical research methods, and public health interventions. Class activities, group work, and field visits will encourage collaborative learning and practical skill development. Online resources, research articles, community outreach and simulation exercises for real-time application will be used for practical experience.

Public Health

Theory (20 hours)

Theory (Total: 20 hours)	Topics
1. Epidemiological Principles	- Hill's Criteria for Causality: Strength, Consistency, Specificity, Temporality, Biological Plausibility - Dose-Response Relationship - Biological Gradient
2. Epidemiological Surveillance	- Public Health Surveillance: Introduction and types - Surveillance Systems: In India, WHO, CDC etc.
3. Outbreak Investigation	- Overview of outbreak investigation principles and process.
4. Epidemiological Models	- Epidemic Curve - SIR Model
5. Screening in Public Health Practice	- Define screening and describe its role in public health - Determine diseases for which it is appropriate to screen - Design and evaluate screening programs

Introduction to Clinical Research (Total: 20 hours)	
1. Introduction	- Definition, scope, types of clinical research: Basic vs. Applied Research, Clinical Trials (Phase I, II, III, IV), Observational Studies - Importance of evidence-based medicine - Ethical considerations in clinical research
2. Study Designs	- Randomized Controlled Trials (RCTs) - Cohort Studies, Case-Control Studies, Cross-Sectional Studies, Ecological Studies - Blinding, Randomization, Biases
3. Sampling Methods	- Types of Sampling: Random, Stratified, Convenience - Rationale, advantages, and limitations
4. Data Types	- Quantitative (Continuous, Discrete, Binary, Ordinal) - Qualitative (Nominal, Textual) - Time-based Data (Survival)
5. Research Question, Aims, and Objectives	- Framing Research Questions using PICO(T) - Crafting Aims and Objectives (Specific, Measurable, Achievable, Relevant, Time-bound)

Books for reference

1. Principles of Epidemiology in Public Health Practice: An Introduction to Applied Epidemiology and Biostatistics by Ray M. Merrill
2. Public Health Surveillance: A Tool for Targeting and Monitoring Interventions by Jennifer L. C. D. McFarland
3. Outbreak Investigation: A Practical Guide by William R. D. O'Neill
4. Public Health Screening by M. J. S. Green and J. M. Elliott
5. Clinical Research: A Practical Guide for Physicians by Robert B. Talley and Simon O'Connor

YEAR-III-SEMESTER V
BPA 28. EMERGENCY MEDICINE

Goal:

To provide care in an emergency, without any faults or lack of confidence and independent of the location of the emergency. To equip the students with self-confidence to be able to manage clinical decision-making under pressure of time when it is essential to save lives.

Learning Objectives

At the end of the course the student will have knowledge of the following:

- Have basic science knowledge and application of knowledge to emergency medicine and the assessment and immediate treatment of emergencies.
- Develop and improve existing clinical and examination skills and apply them in clinical practice to develop comprehensive differential diagnoses and management plans.
- Analyze clinical findings and develop and modify the differential diagnosis to a full range of clinical circumstances
- Competency in commonly used procedural skills, including all forms of resuscitation, life support, airway management, and commonly used emergency procedural skills in both adults and children
- Acquire specialized communication and interpersonal skills required for outstanding communication with patients, families, other providers, and administrative staff in emergency situations

Pre-requisites

Thorough knowledge of anatomy, physiology, biochemistry, microbiology, pharmacology disease conditions and possess basic surgical skills and handling of bio-medical equipment

Theory: 80 Hours

Topic	Content
1. Introduction to Emergency Medical Care (4 hours)	Overview of emergency care and EMS system, quality improvement, and medical direction.
2. Lifting and Moving Patients (4 hours)	Principles of body mechanics, proper lifting, and techniques for moving patients using appropriate equipment.
3. Airway Management (6 hours)	Airway anatomy, methods for maintaining an open airway, use of suction equipment, oxygen delivery, and resuscitation devices.
4. Initial Assessment of Patient (6 hours)	General impression, ABCs assessment, and prioritizing care during initial patient evaluation.
5. Trauma Patients (5 hours)	Rapid assessment methods, trauma triage principles, and management strategies for trauma patients.
6. Medical Patients (5 hours)	Approach to assessing medical complaints, history-taking, and physical examination techniques.
7. Communication Techniques in Emergency Care (4 hours)	Effective communication with patients, families, and healthcare team during emergencies.
8. Documentation in Emergency Care (5 hours)	Legal and ethical aspects of patient documentation, writing accurate reports, handling patient refusal.
9. Differential Diagnosis for Common Symptoms (5 hours)	Assessment and management of common emergency symptoms like chest pain, respiratory distress, GI bleed, and trauma, with a focus on polytrauma.
10. Respiratory Emergencies (4 hours)	Management of asthma, COPD, pneumonia, and pneumothorax in emergencies.
11. Cardiovascular Emergencies (6 hours)	Acute conditions like ACS, heart failure, pericarditis, aortic dissection, and hypertensive crises.
12. GI Emergencies (5 hours)	Assessment and management of conditions like appendicitis, bowel obstruction, GI bleeding, and perforated viscera.
13. Endocrine Emergencies (4 hours)	Management of hyperkalemia, hypokalemia, thyroid storm, and other common endocrine emergencies.
14. Genito-urinary Emergencies (5 hours)	Assessment and management of conditions like ectopic pregnancy, testicular torsion, renal calculi, and pelvic inflammatory disease.

15. Neurological Emergencies (5 hours)	Management of stroke, intracranial hemorrhage, meningitis, and seizures.
16. Psychiatric Emergencies (4 hours)	Handling psychiatric emergencies including aggression and suicidal ideation.
17. Ophthalmology & ENT Emergencies (5 hours)	Management of traumatic eye conditions, otitis, sinusitis, epistaxis, and foreign body obstructions.
18. Acute Allergies and Anaphylaxis (5 hours)	Diagnosis and management of allergic reactions and anaphylaxis in emergency care.
19. Poisoning and Overdose (5 hours)	Clinical signs, symptoms, and management of poisoning and overdose.
20. Environmental Emergencies, Burns, and Drowning (5 hours)	Emergency care for heat/cold exposure, burns, and drowning incidents.
21. Bleeding and Shock (5 hours)	Management of internal and external bleeding, shock recognition, and treatment protocols.
22. Introduction to Mass Disaster Management (4 hours)	Overview of emergency response during mass disasters, including triaging and resource allocation.
23. Trauma in Pregnancy (4 hours)	Approach to managing trauma in pregnant patients, addressing unique challenges.
24. Shock (5 hours)	Detailed understanding of shock pathophysiology and management in emergency settings.

Practical (80 hours)

Practical Skills	Activities
1. Patient Assessment and Diagnosis	Take focused histories and perform physical examinations for rapid diagnosis in emergency situations.
2. Differential Diagnosis and Critical Thinking	Develop differential diagnoses based on symptoms and clinical presentations.
3. Ordering and Interpreting Diagnostic Tests	Learn how to order diagnostic tests quickly and interpret results under pressure.
4. Managing Emergency Conditions	Administer treatments for emergencies like cardiac arrest, respiratory failure, trauma, and poisoning.
5. Cardiac Monitoring	Monitor and interpret cardiac rhythms, EKGs, and vital signs in emergency situations.
6. Cardiac Defibrillation and CPR	Perform advanced cardiac life support, including defibrillation and CPR for adults, children, and infants.
7. Basic Emergency Procedures	Placement of nasogastric tubes, Foley catheters, IV lines, and oxygen therapy management.
8. Advanced Airway Management	Practice endotracheal intubation, use of advanced airway devices, and ventilation techniques.
9. Surgical Procedures	Learn basic surgical procedures like wound closure, incision and drainage, and managing traumatic injuries.
10. Cervical Spine Stabilization	Practice proper cervical spine immobilization during patient transfer.
11. Patient Retrieval and Transfer	Understand and practice the proper use of emergency medical equipment for safe patient transport.
12. Triage and Mass Casualty Management	Practice triaging patients in mass casualty scenarios, prioritizing care, and understanding disaster response protocols.
13. Referral and Collaboration	Learn when and how to refer patients to specialists and collaborate with healthcare providers.

Books for Reference:

- Medical Emergencies: Treatment and Management by Robinson
- Manual of Emergency Medicine by Richard Braen

BPA 29. PAEDIATRICS

Goal

To impart adequate knowledge and appropriate skill for optimally dealing with major health problems of children to ensure their optimal growth and development.

Learning Objectives

- Diagnose and appropriately treat common pediatric and neonatal illnesses.
- Describe the common pediatric disorders and emergencies in terms of epidemiology,
- etiopathogenesis, clinical manifestations, diagnosis, rational therapy and rehabilitation
- Identify pediatric and neonatal illnesses and problems that require secondary and tertiary
- care and refer them appropriately.
- Advise and interpret relevant investigations.
- Counsel and guide patient‘s parents and relatives regarding the illness, the appropriate
- care, the possible complications and the prognosis.
- Provide emergency cardiopulmonary resuscitation to new-born and children.
- Describe preventive strategies for common infectious disorders, malnutrition, genetic and
- metabolic disorders, poisonings, accidents and child abuse.
- Participate in the National Health Programmes effectively.
- Diagnose and effectively treat acute pediatric and neonatal emergencies.
- Discharge medico-legal and ethical responsibilities.
- Perform routine investigative and therapeutic procedures, as applicable to children
- including neonates.
- Describe the normal growth and development during fetal life, neonatal period,
- childhood and adolescence and outline deviations thereof.

- Describe the common pediatric disorders and emergencies in terms of epidemiology,
- etiopathogenesis, clinical manifestations, diagnosis, rational therapy and rehabilitation.
- State age related requirements of calories, fluids, nutrients, drugs etc. in health and
- disease.
- Describe preventive strategies for common infectious disorders, malnutrition, genetic and
- metabolic disorders, poisoning, accidents and child abuse.

Pre-requisites:

Knowledge on general anatomy, physiology, pathology, microbiology, pharmacology, genetics and basics of emergency medicine

Theory: 70 hours

Topic	Content
1. Growth and Development (10 hours)	Determinants of growth and assessment, growth monitoring, anthropometry, developmental milestones, and immunization schedules.
2. Nutrition and Disorders (10 hours)	Age-related nutritional needs, protein-energy malnutrition, vitamin deficiencies, obesity, and nutritional anemia.
3. Infectious Diseases (7 hours)	Common exanthematous illnesses (measles, chickenpox, mumps), tuberculosis, parasitic infestations, and childhood AIDS.
4. Respiratory System (6 hours)	Common respiratory conditions like cold, otitis media, pneumonia, bronchiolitis, and bronchial asthma.
5. Gastrointestinal System (6 hours)	Approach to jaundice, abdominal pain, diarrhea, dehydration, oral rehydration, and chronic diarrhea.
6. Central Nervous System (8 hours)	Evaluation of milestones, convulsions, meningitis, encephalitis, cerebral malaria, epilepsy, and cerebral palsy.
7. Cardiovascular System (5 hours)	Diagnosis and management of rheumatic fever, heart diseases, and congenital heart anomalies.
8. Genito-Urinary System (5 hours)	Post-streptococcal glomerulonephritis, nephrotic syndrome, urinary tract infections, renal failure, and obstructive uropathy.

9. Endocrinology (4 hours)	Diagnosis and management of diabetes, hypothyroidism, hyperthyroidism, delayed and precocious puberty.
10. Neonatology (9 hours)	Neonatal resuscitation, birth asphyxia, jaundice, infections, low birth weight, and special care for sick newborns.
11. Pediatrics Emergencies (6 hours)	Management of status epilepticus, asthma, shock, burns, hypertensive emergencies, gastrointestinal bleeds, and comatose children.
12. Fluid and Electrolyte Balance (3 hours)	Principles of fluid therapy, acid-base imbalance, and management strategies.
13. Genetics (2 hours)	Inheritance disorders and genetic diagnosis, with emphasis on Down's Syndrome.
14. Behavioral Problems (2 hours)	Behavioral issues such as breath-holding spells, nocturnal enuresis, temper tantrums, and pica.
15. Pediatrics Surgical Problems (3 hours)	Surgical management of conditions like cleft lip/palate, hypospadias, inguinal hernia, hydrocephalus, and other common surgical conditions.
16. Therapeutics (2 hours)	Pediatric doses, drug combinations, and age-specific choice of antibiotics.

Practical (80 Hours)

Practical Skills	Activities
1. History Taking and Physical Examination (10 hours)	Take a detailed pediatric history, perform age-appropriate physical exams, and make clinical diagnoses.
2. Bedside Investigations (8 hours)	Perform common bedside procedures like urine analysis, stool examination, and blood tests.
3. Anthropometry and Growth Monitoring (5 hours)	Measure and assess growth of children using weight, height, head circumference, and use growth charts.
4. Neonatal Resuscitation (6 hours)	Practice neonatal resuscitation on mannequins and perform newborn care, including temperature regulation and feeding.
5. Immunization Administration (5 hours)	Administer vaccines as per the national immunization schedule and practice cold chain management.
6. Basic Emergency Care (8 hours)	Practice pediatric CPR, manage pediatric asthma attacks, status epilepticus, and other pediatric emergencies.
7. Fluid and Electrolyte Therapy (5 hours)	Prepare and administer ORS, manage dehydration, and conduct fluid balance assessments.
8. Diagnostic Procedures (8 hours)	Observe and assist in procedures like lumbar puncture, bone marrow aspiration, liver biopsy, and pleural/ascitic tap.
9. Neonatal Care and Feeding (8 hours)	Care for neonates including preterm infants, low birth weight, and administer nasogastric feeds.
10. Pediatric Surgical Skills (7 hours)	Assist with common pediatric surgeries like cleft lip/palate repair, hernia repair, and hypospadias.
11. Clinical Rotations (10 hours)	Participate in pediatric wards, OPD, and critical care units, gaining hands-on experience with managing pediatric cases.

Books for references

- Emergency Medicine: A Comprehensive Review by Kevin J. Knoop, Jennifer R. S. Bragg, and Jeremy R. D. Brown
- Manual of Emergency Medicine by David S. Cline and Peter A. L. Chamberlain

BPA 30. INTRODUCTION TO HEALTHCARE MANAGEMENT

Goal:

To provide an overview of management principles

Learning Objectives:

At the end of the course, the student will be able to:

- Understand the role of healthcare administration within the broader context of healthcare delivery systems
- Identify the organizational structure of healthcare facilities, including hospitals, outpatient centers, and long-term care facilities.
- Describe effective strategic management
- Demonstrate understanding of decision making, conflict and stress management techniques
- Demonstrate understanding in change and innovation and change in management
- Demonstrate understanding of teams, groups, leadership
- Analyze financial management in healthcare**,** including budgeting, reimbursement, and resource allocation.
- Demonstrate understanding of time management, cost and efficiency

Theory (40 hours)

Topic	Hours
1. Overview of Management	3 hours
2. Management Process: Planning, Organizing, Staffing, Directing, and Controlling	3 hours
3. Strategic Management	3 hours
4. Foundations of Planning	3 hours
5. Planning Tools and Techniques	3 hours
6. Decision Making, Conflict, and Stress Management	3 hours
7. Healthcare Financing and Economics	4 hours
8. Organizational Behavior in Healthcare	3 hours
9. Managing Change and Innovation	3 hours
10. Understanding Groups and Teams	2 hours
11. Leadership	3 hours
12. Time Management	2 hours
13. Management of Human Resources	2 hours
14. Quality Improvement	3 hours
15. Cost and Efficiency	2 hours
16. Technology and Healthcare Administration	3 hours
Practical (40 hours)	
Case Study Analysis	5 hours
Healthcare Organization Visits	5 hours
Strategic Planning Exercise	5 hours
Role-Playing: Decision Making & Conflict Management	5 hours
Budgeting and Financial Analysis Workshop	5 hours
Time Management Simulation	5 hours
Leadership and Teamwork Exercises	5 hours
Quality Improvement Project	5 hours
Healthcare Technology Integration	5 hours

Books for references

1. Introduction to Health Care Management by Sharon B. Buchbinder and Nancy H. Shanks
2. Healthcare Management: Principles and Practices" by C. P. Mathew

BPA 31.MEDICAL ETHICS AND LAW

Goal:

To impart knowledge on ethical conduct during practice and research, the laws governing medicine in India, the provider-patient relationship, and the etiquettes and principles to be followed in the profession.

Learning Objectives:

By the end of the course, students should be able to:

- Distinguish between correct and incorrect medical practice.
- Understand patient-provider rights and responsibilities.
- Be aware of the ethics and laws involved in medical care for special populations and special situations (e.g., Abortion, euthanasia).
- Understand patient privacy and confidentiality.
- Navigate medical practice in compliance with relevant legal and ethical guidelines.

Theory (40 hours)

Topics	Duration
1. The Hippocratic Oath and its Relevance to the PA Profession	4 hours
History, significance, and principles of medical ethics; application in the PA profession.	
2. The PA Profession: Roles, Responsibilities, and Limitations	4 hours
Scope of practice, duties, ethical obligations, and understanding the PA‘s role within the healthcare team.	
3. History of Medical Ethics	4 hours
Evolution of medical ethics, key philosophies, and historical case studies (e.g., Nuremberg Code).	
4. Understanding Life and Death	5 hours
Ethical considerations on life and death, end-of-life care, organ donation, and cultural/philosophical views.	
5. Patient’s Access to Medical Care: Focus on Equity, Equality, and Bias	5 hours
Addressing equity, bias, and discrimination in healthcare, global health inequities, and healthcare policies.	

6. Medical Malpractice: Definition, Understanding, and Laws Related to Medical Malpractice	4 hours
Definition, types, negligence, legal principles, and Indian laws governing malpractice.	
7. Healthcare Provider's Responsibility to Oneself, to the Patients, and to Society	4 hours
Professional conduct, patient advocacy, maintaining boundaries, and social responsibility in healthcare.	
8. The Informed Consent in Medical Practice	5 hours
Definition, legal framework in India, and ethical considerations of obtaining informed consent in special situations.	
9. Ethics and Laws Governing Special Situations in Medical Care	5 hours
Ethical and legal issues in mental health, abortion, euthanasia, HIV, genetic testing, and organ transplantation.	
Practical (40 hours)	**Duration**
1. Group Discussions on Medical Ethics and Laws	15 hours
Case studies, role-play on ethical dilemmas in patient autonomy, life-sustaining treatments, and medical malpractice.	
2. Court Sessions on Medical Malpractice	5 hours
Understanding legal processes in medical malpractice claims and appreciating healthcare professionals' duties.	
3. Simulated Informed Consent Process	5 hours
Practice obtaining informed consent in various healthcare scenarios through role-play and communication skills.	
4. Patient Privacy and Confidentiality Workshop	5 hours
Discussing real cases of privacy breaches, studying privacy protocols, and understanding patient confidentiality.	
5. Workshops on Special Situations	10 hours
Ethical dilemmas related to mental health, abortion, euthanasia, organ donation, and surrogacy through role-play and case discussions.	

Books for reference:

1. Medical Ethics: Principles, Persons, and Problems by Edmund D. Pellegrino
2. Textbook of Medical Jurisprudence and Toxicology by C.K. Kuriakose

BPA 32. COMMUNITY MEDICINE AND CLINICAL RESEARCH (II)

Goals:

This course provides students with a strong understanding of public health issues, including health disparities, nutrition, infectious disease control, and maternal health. In clinical research, students will learn biostatistics, research documentation, literature review, and data management. It equips students with the skills needed to address public health challenges and conduct clinical research.

Learning Methodology and Settings:

The course will use a combination of lectures, case studies, interactive discussions, hands-on exercises, and real-world applications. Students will engage in group activities, review current public health reports, and conduct mock clinical research using hospital or community-based data. In-person or online resources, simulations, and field visits will support the learning process, preparing students for real-world public health practice and clinical research.

Learning Objectives:

- Understand the impact of social determinants like race, ethnicity, and socio-economic status on health disparities.
- Apply knowledge of nutrition and public health to develop effective nutrition interventions and programs.
- Evaluate social and behavioral health factors and design health promotion strategies.
- Learn methods for controlling infectious diseases and improving maternal and child health outcomes.
- Grasp basic and inferential statistical methods to analyze clinical research data.
- Develop research protocols, proposals, and case report forms (CRFs) for clinical studies.
- Conduct literature reviews and critically appraise clinical research.
- Apply data management practices, including survey design and data validation, in clinical research.

Public Health Theory 25 hours

Topics	Duration
1. Health Disparities and Health Equity	5 hours
Health disparities across populations (race, ethnicity, gender, socio-economic status); approaches to addressing inequities; cultural competency in public health; policy and program strategies.	
2. Nutrition and Public Health	5 hours
Relationship between nutrition and health outcomes; nutritional interventions and programs; food security; global nutrition challenges (undernutrition, obesity).	
3. Social and Behavioral Health	5 hours
Behavioral science in public health (health behaviors, risk factors); health promotion strategies; mental health and substance abuse; social and cultural factors affecting health.	
4. Infectious Disease Control	5 hours
Prevention and control of infectious diseases (vaccination, quarantine); epidemiology of diseases (HIV, tuberculosis, malaria); outbreak preparedness; surveillance and reporting.	
5. Maternal and Child Health	5 hours
Reproductive health, prenatal care, maternal mortality; child health, nutrition, immunization; adolescent health; early childhood development and education.	
Clinical Research theory (25 hours)	**Duration**
1. Introduction to Biostatistics	5 hours
Basic concepts in biostatistics; descriptive statistics; graphical representation; data distribution; hypothesis testing; confidence intervals; p-values; power and sample size.	
2. Inferential Statistics for Clinical Research	5 hours
Comparison of means (t-test, ANOVA); comparison of proportions (chi-square test); correlation and regression (Pearson‘s, linear, logistic); survival analysis (Kaplan-Meier, Cox model).	
3. Research Documents	5 hours
Research protocols and proposals; writing clinical research proposals; case report forms (CRFs); informed consent forms.	

4. Literature Review in Clinical Research	5 hours
Importance of literature review; reviewing existing research; critical appraisal; identifying gaps in current research.	
5. Data Management in Clinical Research	5 hours
Data collection methods; survey design; data validation and cleaning; handling missing data; data security and governance.	
Practical (60 hours)	**Duration**
1. Health Disparities and Health Equity	4 hours
Analyze health outcomes across different populations using NFHS and state health data; propose strategies to reduce health inequities.	
2. Nutrition and Public Health	6 hours
Assess nutrition-related public health issues in India (undernutrition, obesity); propose nutrition interventions based on ICMR studies and NNMB reports.	
3. Social and Behavioral Health	5 hours
Conduct surveys on health behaviors (smoking, alcohol use) in local communities; design and present health promotion campaigns.	
4. Infectious Disease Control	10 hours
Participate in simulated outbreak investigations (dengue, malaria, tuberculosis); track outbreaks, develop response plans, and monitor interventions using surveillance systems.	
5. Maternal and Child Health	5 hours
Evaluate maternal and child health programs (e.g., JSY); use health survey data to assess mortality rates, vaccination, and growth monitoring; propose community interventions.	
6. Introduction to Biostatistics	5 hours
Use statistical tools to analyze real clinical data; create graphs and calculate descriptive statistics (mean, median, SD).	
7. Inferential Statistics for Clinical Research	5 hours
Apply t-tests, chi-square tests, and regression analyses (linear, logistic) on simulated clinical trial data.	

8. Research Documents	8 hours
Develop research proposals, CRFs, and informed consent forms; draft a research protocol with study objectives, methodology, and ethical considerations.	
9. Literature Review in Clinical Research	6 hours
Conduct literature review using online databases (PubMed, Google Scholar); summarize key studies and evaluate research gaps.	
10. Data Management in Clinical Research	6 hours
Design a pilot survey for clinical research, structure questions, validate data, handle missing data, and learn data security compliance.	

SEMESTER VI

BPA 33. NON-COMMUNICABLE DISEASES

Goal:

The course is designed to provide students with a clinical understanding of Non-Communicable Diseases (NCDs), emphasizing the diagnosis, management, treatment, and prevention of these diseases in the Indian context. The course will focus on cardiovascular diseases, diabetes, chronic respiratory diseases, cancer, mental health disorders, and the role of smoking, alcohol, and public health policies in managing these conditions. Students will also gain insight into the psychosocial impact of NCDs and the importance of public health interventions.

Learning Objectives:

By the end of the course, students will:

- Diagnose and manage common NCDs (Cardiovascular diseases, diabetes, chronic respiratory diseases, cancer, and mental health), considering the impact of lifestyle factors like smoking and alcohol.
- Understand India‘s public health policies related to NCDs, including the control of smoking and alcohol.
- Recognize the role of public health interventions, including tobacco and alcohol control programs, in preventing and managing NCDs.
- Learn how smoking, alcohol consumption, and other lifestyle factors contribute to the development and progression of NCDs.
- Integrate clinical management with an understanding of psychosocial factors in chronic disease care.

Theory (70 hours)

Topics	Duration
1. Introduction to Non-Communicable Diseases (NCDs)	5 hours
Overview of NCDs in India, common pathophysiological mechanisms, multimorbidity, public health policies (NPCDCS), lifestyle factors (smoking, alcohol, diet).	
2. Cardiovascular Diseases	12 hours
Clinical presentation of hypertension, ischemic heart disease, heart failure, stroke; pathophysiology, smoking & alcohol impact, diagnosis, pharmacological treatment, preventive measures.	
3. Diabetes Mellitus	10 hours
Types (Type 1, Type 2, Gestational); pathophysiology, complications, diagnosis, lifestyle impact, management, preventive measures.	
4. Chronic Respiratory Diseases	7 hours
Common diseases (COPD, asthma, pulmonary fibrosis); pathophysiology, smoking & alcohol impact, diagnosis, management, preventive measures.	
5. Cancer Diagnosis and Management	8 hours
Common cancers, pathophysiology (tumor biology, metastasis), smoking & alcohol impact, management (chemotherapy, surgery), preventive measures (screening, vaccination).	
6. Mental Health Disorders	8 hours
Overview of depression, anxiety, bipolar disorder, schizophrenia, substance use disorders; pathophysiology, smoking & alcohol impact, diagnosis & management, preventive measures.	
7. Hypertension and Mental Health	5 hours
Hypertension pathophysiology, lifestyle factors (smoking, alcohol), management, psychosocial impact, preventive measures.	
8. Role of Lifestyle Modifications in Managing NCDs	7 hours
Role of diet and exercise, smoking cessation, alcohol control, psychosocial factors in managing NCDs.	
9. Public Health Frameworks in NCD Management	3 hours
NCD prevention and control in India, tobacco and alcohol policies (COTPA, NTCP), effectiveness in NCD prevention.	

Practical (80 hours)	Duration
1. Clinical Examination of Cardiovascular Diseases	8 hours
History taking, physical examination (heart failure signs, pulse rate, blood pressure), ECG interpretation, lifestyle impacts.	
2. Diabetes Mellitus Management	8 hours
Practical (80 hours)	Duration
Blood glucose testing, OGTT, patient education on monitoring blood glucose, insulin administration, mental health screening.	
3. Respiratory System Examination	8 hours
Respiratory history, physical examination (signs of distress, tactile fremitus, chest expansion), spirometry, smoking cessation counseling.	
4. Cancer Screening and Management	8 hours
Clinical screening exams (breast, cervical, abdominal palpation), tumor markers (PSA, CA-125), palliative care principles.	
5. Mental Health Disorder Screening	12 hours
Use standardized mental health screening tools (depression, anxiety, substance abuse), structured interviews, case studies, role play.	
6. Hypertension Management	8 hours
Accurate blood pressure measurement, hypertension diagnosis, lifestyle counseling, mental health assessments for hypertensive patients.	
7. Role of Lifestyle Modifications in NCDs	10 hours
Educating patients on diet, exercise, tobacco/alcohol cessation, providing psychosocial support for lifestyle changes.	
8. Public Health Frameworks in NCD Management	7 hours
Discussing public health education strategies, developing interventions for smoking cessation and alcohol control.	

Books for reference

1. Textbook of Preventive and Social Medicine by K. Park
2. Non-Communicable Diseases in India: Burden, Strategies, and Policy by R.K. Goel & S.K. Bansal
3. Public Health in India: The Role of Non-Communicable Diseases by K. Srinath Reddy & Rishad R. M.
4. Principles of Preventive Medicine by S. N. Bansal & R. K. Gupta
5. Chronic Disease Epidemiology and Control by M. L. K. Rao

BPA 34. GERIATRIC MEDICINE

Goal

To equip PA students with the knowledge, skills, and attitudes to diagnose, manage, and rehabilitate older patients across various settings (in-patient, home, community, and day hospitals). Students will also learn to provide care that includes multi-disciplinary team collaboration, ethical decision-making, and effective communication in the context of geriatrics.

Learning Objectives:

- Understand the biological, physiological, and psychosocial aspects of ageing.
- Learn how to assess, diagnose, and manage common geriatric conditions in multiple clinical settings.
- Develop skills in preventive care, rehabilitation, and palliative care for older adults.
- Gain knowledge of legal, ethical, and economic issues relevant to elderly patients.

Theory: 60 Hours

Topic
1. Basic Sciences in Geriatrics (10 hours)
1.1 Biology of Human Ageing (2 hours): Theories of ageing, molecular/cellular mechanisms, telomeres, mitochondrial dysfunction
1.2 Epidemiology of Human Ageing (2 hours): Demographics of aging, common health challenges, epidemiological approaches
1.3 Immunology of Ageing (3 hours): Changes in immune function, immunosenescence, inflammation in ageing
1.4 Effects of Ageing on Organs (3 hours): Cardiovascular, respiratory, renal, musculoskeletal, nervous systems impact
1.5 Death and End-of-Life Care (1 hour): Physiological changes leading to death, ethical/legal considerations, palliative care
2. Clinical Geriatric Medicine (25 hours)
2.1 Geriatric Medicine Overview (3 hours): Clinical presentation, history taking, and multidisciplinary team roles
2.2 Common Patterns of Disease (5 hours): Cardiovascular, endocrine, neurological, renal/genitourinary disorders
2.3 Anemia and Lymphomas in Elderly (3 hours): Causes, diagnosis, and management of anemia and lymphomas
2.4 Immunological Disorders in Elderly (2 hours): Autoimmune diseases, rheumatoid arthritis, lupus
2.5 Cardiovascular System in Ageing (4 hours): Pathophysiology of cardiovascular diseases, management of hypertension, DVT
2.6 Endocrine and Metabolic Disorders (4 hours): Age-related endocrine changes, diabetes, electrolyte disturbances
2.7 Central Nervous System (3 hours): Structural and functional changes in the brain, dementia, Parkinson's
2.8 Musculoskeletal System (3 hours): Osteoarthritis, osteoporosis, myositis, and fractures
2.9 Genitourinary System and Disorders (2 hours): Renal failure, urinary incontinence, prostate disease, gynecological issues
2.10 Pharmacology and Polypharmacy (3 hours): Pharmacokinetics, drug interactions, polypharmacy risks

3. Preventive Geriatrics (10 hours)
3.1 Rehabilitation of Older Patients (4 hours): Physiotherapy, multidisciplinary rehabilitation, functional status assessment
3.2 End-of-Life and Palliative Care (3 hours): Symptom management, ethical decision-making, hospice care
3.3 Legal, Ethical, and Economic Aspects (3 hours): Elder abuse, legal rights, economic implications of elderly care
Practical (70 hours)
Topic
1. History Taking and Physical Examination (15 hours): Detailed history and physical examination, functional status assessment
2. Diagnostic Skills and Investigations (15 hours): Blood tests, imaging, cognitive assessments
3. Management of Geriatric Syndromes (15 hours): Managing chronic diseases, polypharmacy, urinary incontinence care
4. Palliative and End-of-Life Care (10 hours): Pain management, family counseling, end-of-life decision- making
5. Rehabilitation and Multidisciplinary Care (10 hours): Observation of rehabilitation protocols, assistive device training
6. Geriatric Emergency Management (5 hours): Management of acute conditions, emergency interventions in geriatrics

Books for reference

1. Geriatrics: A Practical Approach by Dr. B.K. Mahajan
2. Clinical Geriatrics by Dr. M. S. Bhatia
3. Geriatric Medicine: An Evidence-Based Approach by M. C. S. Khurana

BPA 35. OBSTETRICS AND GYNAECOLOGY

Goals:

Equip students with the necessary knowledge, skills, and attitudes to manage obstetric and gynaecological emergencies, diagnose common conditions, and provide fertility regulation care, especially in resource-limited settings.

Learning Objectives:

- Diagnose and manage normal and abnormal pregnancy (antenatal, intranatal, and postnatal care).
- Address common gynaecological problems and emergencies.
- Counsel patients on fertility regulation methods.
- Gain knowledge on methods of pregnancy termination.
- Apply obstetrics and gynaecology knowledge to rural and community health programs.
- Develop communication and interpersonal skills.

Pre-requisites:

Basic knowledge of anatomy, physiology, microbiology, pathology, pharmacology, and basic surgical skills.

Theory Hours: 70

Section	Topic	Hours
1	Basic Sciences and Anatomy of Reproductive System	10
2	Endocrinology and Hormonal Regulation	10
3	Pregnancy and Placental Development	10
4	Pathophysiology of Reproductive Organs	10
5	Pregnancy and Labour	10
6	Pharmacology in Obstetrics and Gynaecology	5
7	Gynaecological Disorders	10
8	Contraception and Fertility Regulation	5
9	Neonatology and Recent Advances in Obstetrics and Gynaecology	10

Practical: 80 Hours

Practical Area	Topic	Hours
Obstetrics	History Taking and Examination of Pregnant Women	10
Obstetrics	Observation and Assistance in Normal Labour	10
Obstetrics	Managing Postpartum Hemorrhage	10
Obstetrics	Witnessing and Assisting in Cesarean Section, Breech, Forceps, and Vacuum Deliveries	10
Obstetrics	Essential Care of the Newborn	10
Obstetrics	Fetal Monitoring	10
Gynaecology	History Taking and Examination of Female Pelvic Organs	5
Gynaecology	Pap Smear and Wet Smear Preparation	5
Gynaecology	Assisting in Minor Gynaecological Procedures	5
Gynaecology	Medical Termination of Pregnancy (MTP)	5
Gynaecology	Insertion and Removal of Intrauterine Contraceptive Devices (IUCD)	5

Operative Skills:

Topic	Hours
Conducting a Normal Delivery	5
Episiotomy and Perineal Repair	5
Insertion and Removal of Intrauterine Devices (IUCD)	5
Minor Gynecological Surgeries	5
Minilaparotomy for Sterilization (Minilap Tubectomy)	5

Neonatology and Postnatal Care:

Topic	Hours
Neonatal Resuscitation and Care	5
Neonatal Assessment and Management	5

Additional Skills:

Topic	Hours
Basic Life Support and Neonatal Life Support	5
Counselling Skills	5

Books for references

- Textbook of Obstetrics for Undergraduates - V.L. Bhargava
- Manual of Practical Obstetrics - Holland & Brews
- Shaw‘s Textbook of Gynaecology
- Textbook of Gynaecology - V.L. Bhargava

BPA 36. CRITICAL CARE MEDICINE

Goal

The goal of this module is to provide PA students with comprehensive knowledge, skills, and clinical experience to manage critically ill patients in various healthcare settings. The program focuses on understanding the pathophysiology of critical illness, advanced monitoring techniques, and interventions, as well as the development of decision-making abilities in high- pressure environments.

Learning Objectives:

- Understand the basic and advanced concepts of critical care medicine.
- Learn the management of common critical care conditions such as respiratory failure, shock, sepsis, and multi-organ failure.
- Develop skills in the use of monitoring equipment and emergency interventions.
- Understand the ethical and legal aspects of critical care, including end-of-life care and communication with families.
- Gain hands-on experience in managing critically ill patients in real-world settings.

Theory: 30 Hours

Section	Topic	Hours
1	Introduction to Critical Care Medicine	4
2	Pathophysiology of Critical Illness	6
3	Advanced Monitoring Techniques	4
4	Ventilation and Airway Management	6
5	Pharmacology in Critical Care	4
6	Ethical Issues and End-of-Life Care	4
7	Clinical Management of Specific Critical Conditions	2

Practical (30 Hours)

Practical Area	Topic	Hours
Airway and Ventilator Management	Endotracheal Intubation, Ventilator Settings and Management, Non- invasive Ventilation (CPAP/BiPAP)	8
Monitoring and Assessments	Monitoring Equipment (ECG, pulse oximeter, invasive BP monitoring), Arterial Blood Gas (ABG) Sampling and Interpretation, Neurological Monitoring (GCS, ICP)	6
Emergency Interventions and Resuscitation	Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS), Shock Management, Sepsis Management	6
Critical Care Procedures	Central Line Insertion, Arterial Line Insertion, Chest Tube Insertion	5
Multidisciplinary Team Collaboration	Role of PA in Critical Care Team, Patient Management Rounds	3
Palliative Care and Ethical Decision Making	Family Communication, Ethical Dilemmas in ICU	2

Books for references

1. Textbook of Critical Care by Jean-Louis Vincent, Edward Abraham, Frederick A. Moore, and Ronald D. D. Walzer
2. The ICU Book by Paul L. Marino

BPA 37. COMMUNITY MEDICINE AND CLINICAL RESEARCH-III

Goals:

This course aims to provide students with a comprehensive understanding of public health topics such as chronic disease epidemiology, emergency preparedness, health interventions, global health, public health law and ethics, and health policy. In clinical research, students will gain essential skills in data management, visualization, reporting, and manuscript writing. The course prepares students to address public health challenges and contribute to clinical research with practical skills and knowledge.

Learning Methods and Settings:

The course will be delivered through a blend of lectures, case studies, group discussions, practical activities, and assignments. Students will engage with real-world data, participate in role-play scenarios, and use statistical software to analyze and visualize clinical research data.

Learning Objectives:

- Understand the epidemiology and prevention of chronic diseases.
- Develop strategies for emergency preparedness and response.
- Design and evaluate public health interventions.
- Explore global health issues and initiatives.
- Apply ethical principles in public health and clinical research.
- Analyze health policy and its impact on public health outcomes.
- Master clinical data management and visualization techniques.
- Write clear, ethical research manuscripts and reports.

Public Health (Theory 20 hours)

Topic	Content	Hours
Chronic Disease Epidemiology	Prevention and control of chronic diseases (heart disease, diabetes, cancer, etc.) Risk factors for chronic diseases (lifestyle, genetics, environment) Screening and early detection Public health interventions and policy strategies for chronic disease prevention	6
Emergency Preparedness and Response	Public health response to natural disasters and pandemics Emergency preparedness plans and crisis management Public health roles in disaster relief and recovery Community resilience and recovery strategies	6
Public Health Interventions	Community-based public health interventions Health education and promotion programs Behavioral change theories and strategies Evaluation of public health programs and interventions	6
Global Health	Global health challenges (infectious diseases, non-communicable diseases, etc.) Global health initiatives and organizations (WHO, UNICEF, etc.) International health regulations and frameworks Health disparities in low- and middle-income countries	6
Public Health Law and Ethics	Legal principles in public health (quarantine, vaccination laws, etc.) Ethical considerations in public health research and practice Confidentiality and informed consent The balance between individual rights and public health goals	6

Health Policy and Management	Public health systems and organizations (local, national, global) Factors influencing health policy Government structure and ideology Political party platforms and priorities Lobbying and political advocacy Legislative process International politics Healthcare funding and budget Economic growth Healthcare market and private sector Cost of healthcare Inequalities in economic status Demographics Public health needs Health literacy and public awareness Cultural and social norms Advances in medical technology Health information technology Pharmaceutical innovation Evidence-based medicine Public health research and surveillance Laws and regulations Regulatory agencies Climate change and environmental health Global health issues Public opinion Advocacy and social movements Health policy development and analysis Health economics and financing (insurance, cost-effectiveness)	6
Clinical Research (Theory)		20
Topic	**Content**	**Hours**
ata Management in Clinical Research	Data Collection Electronic Data Capture (EDC) Case Report Forms (CRFs) Surveys Survey Design Designing Survey Forms Data Validation and Cleaning Handling Missing Data Data Security Data Governance	5
Data Visualization in Clinical Research	Importance of Data Visualization Types of Visualizations (Histograms, Bar charts, Box plots, Scatter plots, Kaplan-Meier plots) Visualizing Data by Type (Continuous, Categorical, Survival) Using Statistical Software (R, SPSS)	5

Reporting and Interpreting Clinical Data	Interpreting Results (p-values, confidence intervals) Ethical Reporting Clinical Trials Reporting Standards (CONSORT) Critical Appraisal of Clinical Data	5
Manuscript Writing in Clinical Research	Structure of a Research Manuscript Writing a clear introduction, methods, results, discussion, and conclusion Proper data presentation: Tables, Figures, Graphs Ethical Considerations	5
Practical (Public Health)		20
Chronic Disease Epidemiology	Analyze publicly available epidemiological data on chronic diseases like diabetes and heart disease. Identify risk factors (lifestyle, genetics) and design a screening program for early detection of one condition.	5
Global Health	Review global health challenges (e.g., infectious diseases, health disparities) and propose solutions to improve health outcomes in low-income countries. Analyze data from international organizations like WHO and UNICEF.	5
Public Health Law and Ethics	Engage in case studies on public health law topics such as quarantine, vaccination mandates, and informed consent. Debate ethical dilemmas in public health practice, including balancing individual rights with public health goals.	5
Health Policy and Management	Analyze the influence of political and economic factors on any one health policy of India.	5

Practical (Clinical Research)		20
Data Management in Clinical Research	Design a short survey for clinical data collection, focusing on case report forms and electronic data capture tools. Practice data cleaning and validation techniques.	5
Data Visualization in Clinical Research	Use SPSS or R or any other software to create visualizations (e.g., histograms, bar charts, Kaplan-Meier plots) from your survey data sample, focusing on selecting the appropriate visualization type for each data set.	5
Reporting and Interpreting Clinical Data	Interpret the data by calculating p-values, confidence intervals, and clinical significance. Report results following ethical guidelines, ensuring transparency and accuracy.	5
Manuscript Writing in Clinical Research	Write sections of a clinical research manuscript, focusing on structure (introduction, methods, results, discussion) and ensuring clarity, proper data presentation, and adherence to ethical standards.	5

Books for references

1. Emergency Public Health: Preparedness and Response by Linda Y. Lee and Sara E. Raskin
2. Disaster Medicine by Richard P. W. Haines and M. C. Biddinger
3. Indian Health Policy: The Challenges and the Way Forward by R. S. Sood
4. Health Systems in India: Principles, Functions, and Challenges by N. R. Bhatia and B. K. Vaidya

RECENT ADVANCES IN MEDICINE-SEMINAR TOPICS

Goal:

The goal of teaching advances in medicine to PAs is to ensure they are equipped with the latest knowledge, skills, and best practices to deliver high-quality patient care.

Recent advances in medicine will be spread out from semester III-VI and be taught by guest lectures and discussed in seminars. The topics will be placed under relevant subjects. Saturdays or any one day in a week will be allocated as needed for these topics.

Learning Objectives:

Students will be able to-

Understand the fundamentals of personalized medicine and its impact on patient care.
Analyze the advancements in gene editing technologies like CRISPR and their potential in genetic disorders.
Explore the role of immunotherapy, regenerative medicine, and artificial intelligence in modern healthcare.
Gain insights into the emerging field of nanomedicine and its applications in drug delivery and disease management.
Apply knowledge of telemedicine and digital health innovations in clinical practice.
Recognize the significance of microbiome research, antibiotic resistance, and the development of new vaccines.
Assess the impact of robotic-assisted surgery, chronic disease management, and pharmacology in improving healthcare outcomes.

Topics

- **Personalized Medicine**

  Genetic profiling and tailored treatments Pharmacogenomics and drug efficacy Advances in biomarkers for precision medicine

- **Gene Editing and CRISPR Technology** CRISPR-Cas9 in genetic disorders Ethical considerations and regulations Gene therapy for cancer and rare diseases Genetic modifications for disease resistance

- **Immunotherapy**

  Immunotherapy in cancer (CAR-T, checkpoint inhibitors) Development of cancer vaccines
  Advances in autoimmune disease therapies

- **Regenerative Medicine**

  Stem cell therapies and tissue engineering Organ regeneration and 3D bioprinting Advances in wound healing and scar management

- **Artificial Intelligence in Healthcare**

  AI-driven diagnostics (radiology, pathology) Machine learning for personalized treatments AI in drug discovery and clinical trials

- **Nanomedicine**

  Nanoparticles in drug delivery systems Nanosensors for disease detection
  Advances in cancer treatment using nanotechnology

- **Telemedicine and Digital Health**

  Virtual healthcare services and remote monitoring AI and machine learning in telehealth
  Wearable devices for chronic disease management

- **Neuroscience Advances**

  Treatments for neurodegenerative diseases (Alzheimer‘s, Parkinson‘s) Brain-computer interfaces (BCI)
  Advances in mental health treatment and neurostimulation

- **Microbiome Research**

  Gut microbiome‘s role in health and disease

  Probiotics and prebiotics in disease prevention Microbiome-based therapies for metabolic disorders

- **Antibiotic Resistance and New Antibiotics**
  Development of novel antibiotics and alternatives Phage therapy as a solution to resistance
  Global strategies to combat antimicrobial resistance

- **Vaccines and Immunization**

  RNA vaccine technology Advances in vaccines for emerging infectious diseases Universal flu vaccine research

- **Robotics and Surgery**

  Robotic-assisted surgeries and minimally invasive procedures Impact on recovery and precision Innovations in robotic prosthetics

- **Chronic Disease Management**

  Advances in diabetes management (smart insulin, artificial pancreas) New treatments for cardiovascular diseases
  Management of chronic pain through advanced therapeutics

- **Pharmacology and Drug Development**

  Targeted drug therapies and monoclonal antibodies Advances in drug delivery systems (nanocarriers, liposomes)

Activities

Personalized Medicine Case Discussion (2 hours)

Read a simple case study about a patient with diabetes or heart disease. Discuss how genetic profiling might influence treatment choices.
Talk about how genetic differences can affect the way patients respond to medications.

Gene Editing and CRISPR Overview (2 hours)

Watch a short video or read an article about CRISPR technology. Discuss what it is and how it could potentially treat genetic disorders like sickle cell anemia.
Discuss the ethical issues surrounding gene editing.

Immunotherapy Case Review (3 hours)

Review a case of a cancer patient who received immunotherapy (like CAR-T therapy). Discuss how this treatment works and what the expected outcomes are.
Talk about possible side effects and how they might be managed.

Regenerative Medicine Case Example (3 hours)

- Discuss a case where stem cell therapy was used to treat a joint injury.
- Talk about how regenerative medicine is changing the way chronic injuries are treated.

Artificial Intelligence in Diagnostics (3 hours)

Read about how AI is being used in radiology or neurology to diagnose diseases. Share an example where AI could help in diagnosing a common condition like pneumonia.

Nanomedicine in Treatment (2 hours)

Watch a video or read about the use of nanoparticles in treating cancer or delivering medication.

Discuss how these tiny particles could make treatments more effective.

Telemedicine Role Play (2 hours)

In pairs, simulate a telemedicine consultation for a patient with a chronic condition (like diabetes or hypertension).
Discuss how virtual healthcare is changing the way patients are managed.

Neuroscience Advances Discussion (3 hours)

Review a simple case study of a patient with Parkinson‘s disease. Discuss how new treatments like deep brain stimulation are helping manage the condition.

Microbiome and Gut Health (2 hours)

Read about the link between gut health and diseases like IBS or obesity. Discuss the potential of probiotics and prebiotics in managing these conditions.
Share examples of how changes in the gut microbiome can affect overall health.

Antibiotic Resistance Case Study (2 hours)

Review a case where antibiotic resistance was a problem (e.g., in a TB patient). Discuss how healthcare professionals can help fight antibiotic resistance.

Vaccines and Immunization Discussion (2 hours)

Read about mRNA vaccines and their role in COVID-19. Discuss how these vaccines work and their potential for future diseases.
Discuss about the challenges of vaccinating large populations.

Robotic Surgery Video Review (2 hours)

Watch a video of a robotic-assisted surgery. Discuss how robotic surgeries are improving precision and recovery time.
Discuss about the role of a PA in supporting robotic-assisted procedures.

CRISPR and Human Enhancement Debate (2 hours)

Read about the ethical issues surrounding genetic enhancement.

Have a short debate on whether genetic modifications should be used to improve human traits, such as resistance to diseases.

Chronic Disease Management Discussion (2 hours)

Review recent advances in managing diabetes, such as smart insulin pumps. Discuss how these new tools can help improve patient care and outcomes.

Pharmacology and New Drug Therapies (2 hours)

Read about new drug therapies, such as monoclonal antibodies for cancer. Discuss how these therapies work and their potential side effects.

Scheme of Examination

First Semester

Course Code	Course Title	Internal Assessment	External University Theory	External University Practical / Viva	Total
BPA 101	Anatomy-I	25	50	25	100
BPA 102	Physiology-I	25	50	25	100
BPA 103	Biochemistry and Molecular Biology- I	25	50	25	100
BPA 104	Microbiology I	25	50	25	100
BPA 105	Introduction to Healthcare Delivery System in India and Community Orientation-I	100	-	-	100
BPA 106	Professionalism, Communication, and soft skills	100	-	-	100
	Total	**300**	**200**	**100**	**600**

Second Semester

Course Code	Course Title	Internal Assessment	External University Theory	External University Practical / Viva	Total
BPA201	Anatomy - II	25	50	25	100
BPA202	Physiology - II	25	50	25	100
BPA203	Biochemistry and Molecular Biology - II	25	50	25	100
BPA204	Medical Microbiology	25	50	25	100
BPA205	Introduction to computers and Professionalism	50	-	50	100
BPA206	Community orientation -II / Clinical skills	100	-	-	100
	Total	**250**	**200**	**150**	**600**

Third Semester

Course Code	Course Title	Internal Assessment	External University Theory	External University Practical / Viva	Total
BPA301	Pharmacology and toxicology -	25	50	25	100
BPA302	Pathology	25	50	25	100
BPA303	General Medicine - I	50	50	-	100
BPA304	Basics of Surgery	50	50	-	100
BPA305	Ophthalmology, ENT and	50	50	-	100
BPA306	Community Orientation /	50	-	50	100
BPA307	BPA Clinics - I	50	-	50	100
	Total	**300**	**250**	**150**	**700**

Fourth Semester

Course Code	Course Title	Internal Assessment	External University Theory	External University Practical / Viva	Total
BPA401	Pharmacology and toxicology - II	25	50	25	100
BPA402	General Medicine-II	50	50	-	100
BPA403	Advanced Surgery	50	50	-	100
BPA404	Psychology and Introduction to Behavioural	50	50	-	100
BPA405	Medical Communication	100	-	-	100
BPA406	Community Medicine and Clinical Research - I	50	-	50	100
BPA407	BPA Clinics - II	50	-	50	100
Total		**375**	**200**	**125**	**700**

Fifth Semester

Course Code	Course Title	Internal Assessment	External University Theory	External University Practical / Viva	Total
BPA501	Paediatrics	50	50	-	100
BPA502	Emergency Medicine	50	50	-	100
BPA 503	Community Medicine and Clinical Research-II	50		50	100
BPA504	Medical Ethics and law	100	-	-	100
BPA 505	Introduction to healthcare	50	50	-	100
BPA506	BPA Clinics - III	50	-	50	100
Total		**350**	**150**	**100**	**600**

Sixth Semester

Course Code	Course Title	Internal Assessment	External University Theory	External University Practical / Viva	Total
BPA 601	Non Communicable Diseases	50	50	-	100
BPA 602	Geriatric Medicine	50	50	-	100
BPA 603	Obstetrics and Gynaecology	50	50	-	100
BPA 604	Critical Care Medicine	50	50	-	100
BPA 605	Community Medicine and Clinical	50	50	-	100
BPA606	Research Project- I	-	-	100	100
BPA607	BPA Clinical IV	50	-	50	100
Total		**300**	**250**	**150**	**700**

6.12. Facilities for the BPA program

Faculty Requirements for BPA program

1. **Teaching Staff for Physician Associate Program**:

The number of teaching faculty members should correspond to the number of subjects. Faculty: Student ratio
Didactic lectures: 1: 25
Clinical instructions: 1: 5

In clinical rotations, students should be posted five per batch to avoid crowding in the labs and clinics and also to provide closer attention to clinical training.

Core Clinical Faculty: The PA program needs highly skilled clinical faculty members with significant experience in clinical medicine**.** These faculty members should ideally have a medical background (e.g., physicians and PAs, or specialists) and be able to teach both clinical theory and hands-on procedures. Part-time faculty or adjunct faculty are preferred for this position. Teaching faculty who are also active practitioners bring real-world knowledge and the most up-to-date clinical practices to the classroom.

Faculty for non-clinical subjects: Faculty who teach non-clinical subjects should have at least post graduate education in the relevant subject. Subject Matter Experts should be involved in the teaching of non-medical subjects such as English, Computers, etc., and for seminar topics for special subjects.

Clinical Supervisors and Preceptors: These are faculty members who provide direct supervision of students during clinical rotations, ensuring that students get the necessary hands-on experience in real-world settings.

2. **Administrative and Support Staff**:

Program Director: Oversees all aspects of the PA program, from curriculum development to clinical site management, ensuring the program‘s overall quality and effectiveness.

Administrative Support Staff: 1
Program Coordinators: For theory, 1 and for clinical, 1
Teaching assistants: Graduate PAs, 2

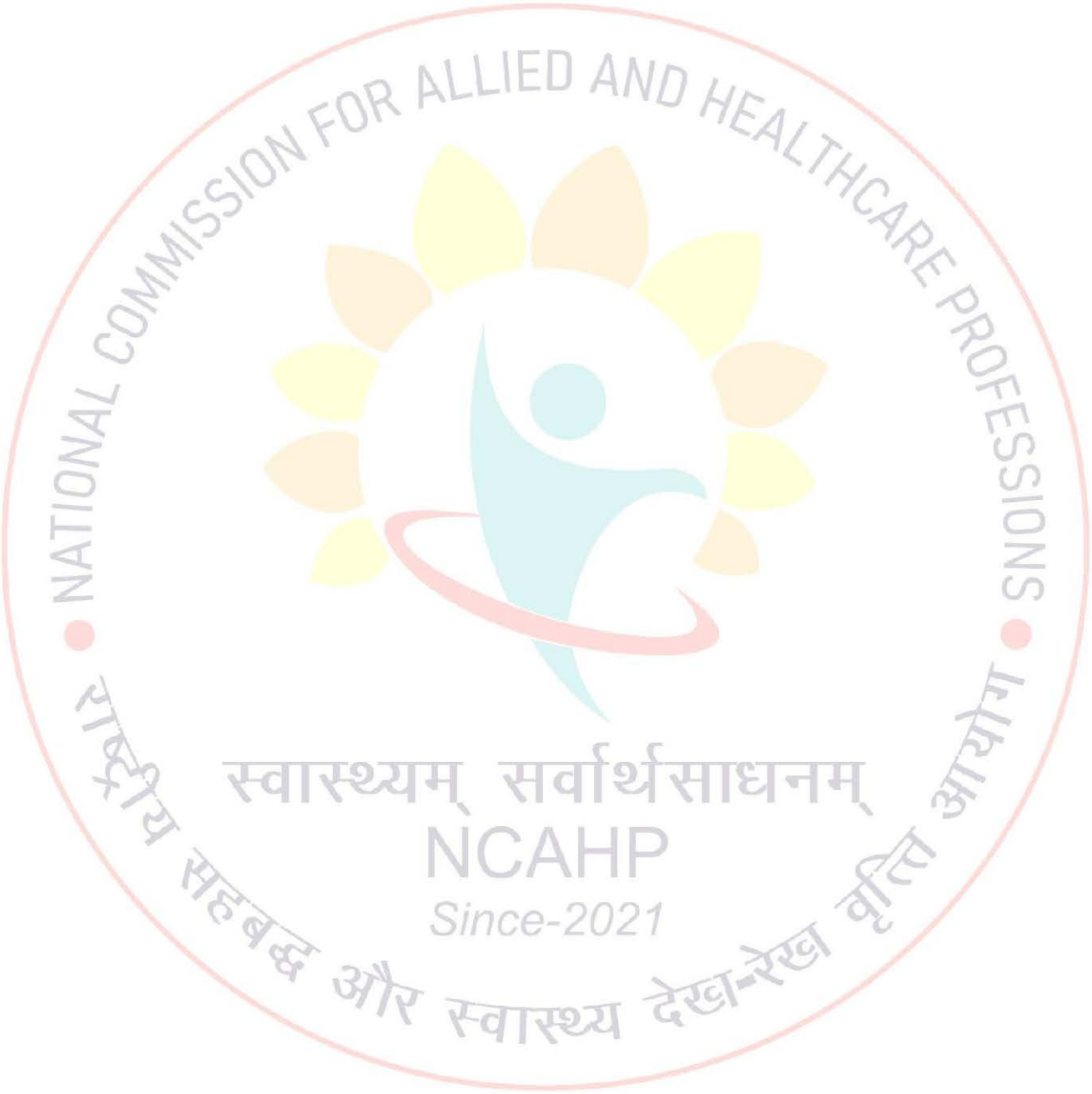
Physical facilities and equipment needed for BPA program

Facility Type	Description
Classrooms	At least three classrooms with AV equipment (projectors, whiteboards, computers) for theoretical teaching dedicated to BPA students. Minimum capacity: 25 students.
Lecture Hall	One lecture hall with computers, AV equipment, and internet Facility
Anatomy and medical Simulation Labs	Anatomy Lab with cadavers and prosected specimens for human anatomy learning and simulators for clinical procedures (venipuncture, suturing, intubation, and patient management), microscopes and charts.
Clinical Skills Lab	-A spacious hall with space for multiple stations for different clinical procedures, allowing for group learning and individual practice**.** Should include privacy areas for patient simulation and performing musculoskeletal examinations. -Tables for practicing physical exams, with space for practicing various patient positions (e.g., supine, prone, seated). Examination stools and chairs for patient interaction. -Basic tools: stethoscopes**,** blood pressure cuffs**,** otoscopes**,** thermometers**,** tongue depressors**,** reflex hammers for exams and diagnostics ECG machines. -Standardized patients for role-play and simulated history-taking/exams. High-fidelity mannequins for physiological simulations and procedure practice
Biochemistry and Microbiology Labs*	Labs for biochemistry, microbiology, hematology, immunology, and pathology.
Radiology and Imaging Facilities*	X-ray, ultrasound, CT scan, and MRI facilities for learning and interpreting diagnostic imaging in real-world clinical settings.
Hospital/Clinical Placement Facilities*	Clinical placements and supervised rotations in hospitals, clinics, or medical centers for real-world hands-on experience in various medical fields taught in different subjects.

Library	A well-stocked library with copies of textbooks, reference books, and relevant journals-either physical copies or subscriptions for electronic versions, computers with internet access, reading tables and chairs.
Computer lab	Computers with necessary software, broad band connection, appropriate furniture, projector. At least 25 computers should be provided for individual students to work.
Office room (s)	Adequate furniture for the Program director, coordinators, teaching assistants, and guests, computers with internet facilities, printer, relevant stationery, notice boards etc.,
Toilets, and dining hall	For staff and students

*Where appropriate clinical exposure facilities are not available within the teaching institute, a Memorandum of Understanding (MoU) should be signed with a nearby hospital or clinical facility capable of providing the necessary training sites. The teaching institute where the students are enrolled will be responsible for paying the clinical site for this arrangement.

Additionally, clinical supervisors should be available at the external clinical site to oversee the training, supervise student activities, and evaluate their performance. Transportation arrangements should be made to facilitate students' travel to external clinical sites. An institute will not be eligible to conduct a BPA program unless it has the necessary facilities for clinical exposure in the majority of clinical subjects taught



CHAPTER 7

Master of Physician Associate Studies (MPA)

7.0 Master of physician associate studies (MPA)

7.1 Eligibility for admission

Bachelor of Physician Associate or equivalent from a recognized university with minimum 5.5 CGPA

7.2 Duration of the course and mode of education

2 years or 4 semesters, full-time/part time, on-campus

7.3 MPA streams

Two streams of the MPA program will be introduced initially:

- Master of Clinical Medicine
- Master of Clinical Surgery

As part of the Master's degree program, students will be actively involved in teaching. To support this, a course on Medical Education will be introduced, with topics spanning across the two-year program.

7.4. Batch size and number of desired faculty

The maximum number of students admitted in each stream should not be more than 10. One coordinator is required for each stream. The head of the department of surgery and medicine would be responsible that the training requirements of the students are met.

7.5 Scope of MPA program

The MPA (Surgery) and MPA (Medicine) programs are designed to provide advanced, multidisciplinary training that integrates clinical expertise with leadership and educational skills. The scope of these programs extends to developing proficiency in diagnosing and managing complex medical and surgical conditions, with a strong emphasis on evidence-based practices, critical thinking, and decision-making. Students will be trained in both theoretical and practical aspects of their respective fields, including surgical procedures, patient care, intensive and emergency management, and specialized medical care. The curriculum also incorporates teaching methods that promote interactive learning, including case studies, hands-on clinical exposure, simulations, and the development of effective communication and leadership skills. A key focus is the ability to navigate medico-legal issues, ethical dilemmas, and the evolving dynamics of healthcare delivery. Furthermore, the programs prepare graduates to contribute to medical education, healthcare policy, and research, fostering the ability to lead healthcare teams, advocate for patient rights, and manage healthcare systems with a global perspective.

7.5 MPA Curriculum Outline

7.6 MPA (Surgery) Semester Subjects

First Semester	1. Applied Basic Anatomy & History Taking 2. Evidence Based Medicine and Research Methods 3. Review of General Surgery and General Anaesthesia with Updates 4. Imaging 5. Consents / Medico-Legal Issues 6. Medical Education I
Second Semester	1. Pre-Operative Management 2. Principles of Operative Surgery 3. Intensive Care 4. Trauma & Shock
Third Semester	1. Vascular Surgery 2. Onco Surgery 3. Uro Surgery 4. Cardiovascular & Thoracic Surgery 5. Ethics, Communication, and Leadership Skills 6. Medical Education III
Fourth Semester	1. Neuro Surgery 2. Orthopaedic Surgery 3. Paediatric Surgery 4. Hepato-Biliary Surgery 5. Medical Education IV

Competencies expected after completing of MPA (surgery)

Competency Area	Competencies
1. Clinical Knowledge and Surgical Expertise	- Comprehensive understanding of surgical principles and techniques across specialties. - Mastery of traditional and minimally invasive techniques. - Application of evidence-based patient care.
2. Surgical Skills and Competence	- Proficiency in performing a wide range of surgeries. - Expertise in surgical tools, techniques, and technologies. - Mastery of postoperative care, including managing complications.
3. Preoperative and Postoperative Management	- Effective management of patient care before and after surgery. - Addressing postoperative complications (infections, bleeding, organ dysfunction). - Optimal pain management strategies.
4. Clinical Decision-Making and Problem- Solving	- Informed, evidence-based decision-making in diagnosing, planning, and executing surgical interventions. - Prioritizing and managing critical cases. - Advanced clinical reasoning for complex challenges.
5. Multidisciplinary Team Collaboration	- Collaborative work with anesthetists, nurses, radiologists, etc. - Leadership in surgical teams. - Coordination of care across specialties.
6. Ethical and Professional Conduct	- Upholding high standards of ethics (patient autonomy, informed consent, confidentiality). - Professional conduct and empathy in patient care. - Addressing ethical dilemmas in surgery.

Competency Area	Competencies
7. Research, Evidence-Based Practice, and Medical Education	- Engagement in research to advance surgical practices. - Application of research to improve patient care. - Active teaching and mentorship. - Conducting teaching sessions and workshops.
8. Healthcare Management and Leadership	- Leadership in managing surgical teams and patient care. - Development of organizational skills in managing surgical departments. - Advocacy for quality care and healthcare policy improvements.
9. Teaching and Educational Leadership	- Mentorship and supervision of students and residents. - Designing and delivering educational programs. - Use of modern teaching tools (simulation, virtual platforms). - Creating a culture of learning in surgery.
10. Communication and Interpersonal Skills	- Effective communication with patients, families, and healthcare teams. - Presenting complex information clearly and empathetically. - Facilitating communication within teams.
11. Commitment to Continuous Professional Development and Teaching	- Lifelong learning through CME, workshops, and conferences. - Reflecting on personal development and engaging in self- assessment. - Seeking feedback and improving clinical and teaching skills.

7.7 MPA (Medicine) First Semester

S1	Subjects
1	Advanced Pathophysiology
2	Clinical Pharmacology
3	Clinical Diagnostics and Decision Making
4	Evidence-Based Medicine & Research Methods
5	Advanced Patient Assessment Skills
6	Core Clinical Medicine-I (systems based)
7	Medical Education-I

Second Semester

S2	Subjects
1	Emergency Medicine and Trauma Care
2	Critical Care and Intensive Care
3	Core Clinical Medicine-II (systems based)
3	Pediatrics
4	Surgical Skills and Postoperative Care
5	Pharmacology in special populations
6	Medical Education II

Third Semester

S3	Subjects
1	Palliative Care
2	Core Clinical Medicine III (systems based)
3	Geriatrics
4	Preventive medicine
5	Ethics, Communication, and Leadership Skills
6	Medical Education-III

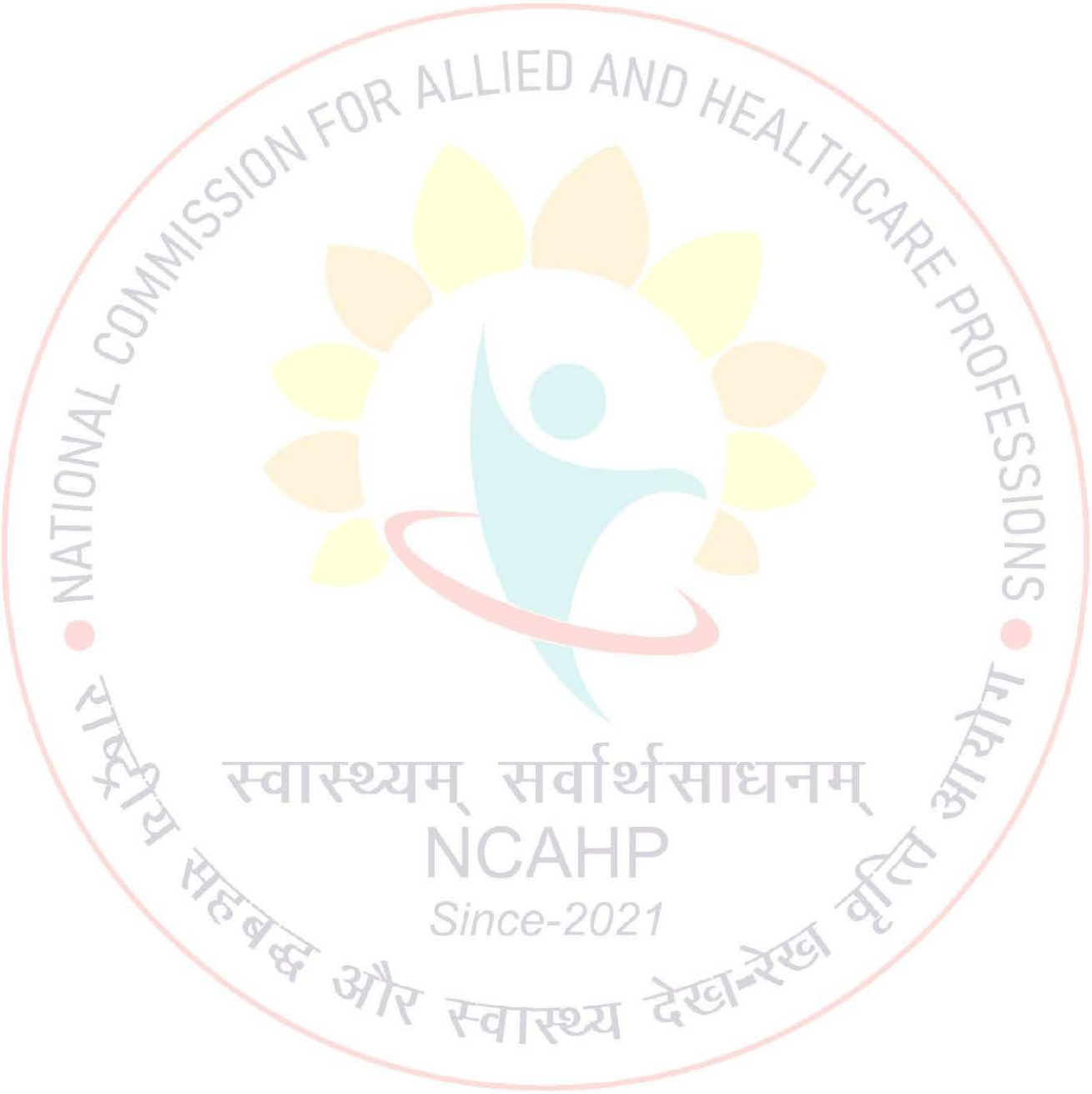
Fourth Semester

S4	Subjects
1	Core Clinical Medicine IV
2	Consents and Medico legal issues
3	Rehabilitative Medicine
4	Medical Education-IV

7.8 Core Components for MPA in surgery and medicine

The subjects in the MPA program are primarily self-directed, with guidance provided by supervisors. One day per week (preferably Saturdays) should be dedicated to case presentations, seminars, group discussions, and journal clubs. Additionally, students enrolled in the MPA program are required to complete and submit a thesis, which is a mandatory component for graduation.

Students should participate in mortality meetings, case reviews, and clinical audits to develop critical thinking and enhance their diagnostic skills. These activities also foster interdisciplinary collaboration, improve communication skills, and expose students to real-world challenges in healthcare settings. Through these experiences, students will gain deeper insights into patient care, clinical decision-making, and the overall healthcare system.



CHAPTER 8

Doctoral Degree (PhD)

8.0 Doctoral Degree (PhD)

8.1 Doctoral Degree Pathways for Physician Associates

As part of the ongoing development of the Physician Associate profession, two distinct doctoral pathways are proposed to further enhance academic and clinical expertise. These pathways aim to foster advanced knowledge, research contributions, and the academic growth of PAs within healthcare.

8.11 Clinical PhD (Doctorate in Heath Science-DHSc: A clinical-focused PhD program designed to advance clinical practice and contribute to evidence-based healthcare in the PA field.

8.12 PhD by Research: A research-oriented PhD pathway for those interested in academic inquiry, clinical research, and expanding the body of knowledge within the PA profession. Further elaboration on these pathways will be addressed as part of the broader academic strategy for PA development. No additional details are provided at this stage.

8.2 Admission criteria

Admission into the Ph.D. programme shall be governed by the relevant UGC norms and per criteria established by the NCAHP. In addition to the norms of UGC and NCAHP, admission into a Ph.D. programme for a PA should be limited to the applicants with the following qualifications currently.

- Bachelor degree in Physician Associate studies with experience (no. of years to be deliberated)
- Master degree in Physician Associate studies

8.3 **Mode of education:** Full time/part time, On-campus/Remote

8.4 Duration of the Ph.D. program

- The minimum duration of the program shall be two years excluding course work.
- If course work is involved, the minimum duration shall be three years.
- For part-time, the minimum duration shall be four years excluding course work.
- The maximum duration for all categories is six years.

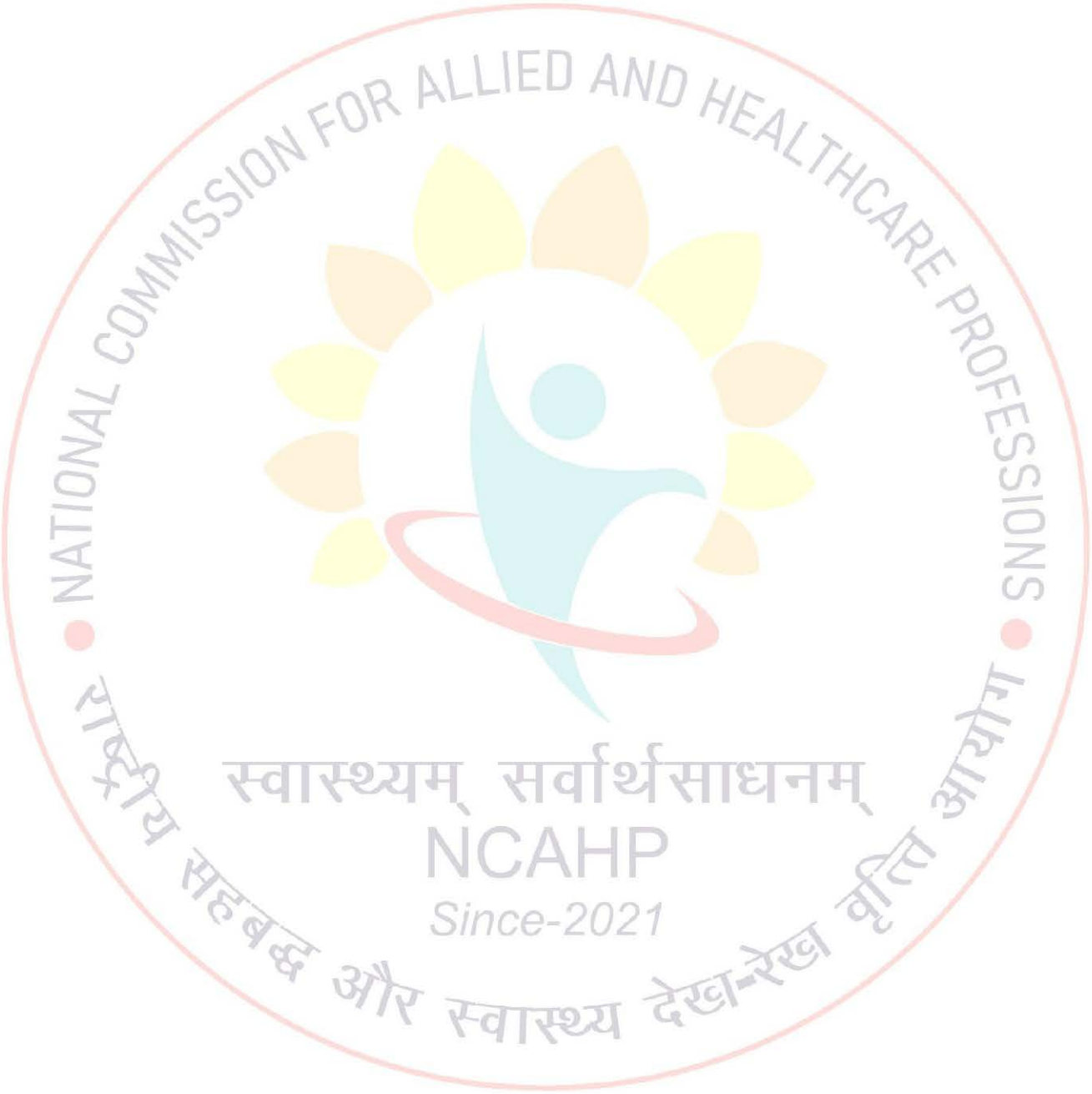
Extension beyond the above limits will be governed by the relevant clauses as stipulated in the Statute/Ordinance of the individual Institution concerned.

8.5 Scope of Doctoral degree

A PhD for PAs can enhance their career prospects and lead to new opportunities in leadership, teaching, research, and other roles.

Practice Areas

- Healthcare institutions: PAs can become clinical directors, program directors, take on leadership roles in in-house training programs.
- Clinical Research**:** PAs can take on roles as primary investigators or co-investigators in clinical trials, as well as provide care to patients involved in studies.
- Teaching**:** With a doctoral degree, PAs can pursue academic careers as educators.
- Administration**:** PAs trained at the doctoral level can step into clinical leadership positions. They are more likely to become program directors, academic directors or clinical directors.
- Research and Publishing**:** PAs with advanced degrees can contribute to research efforts and academic publishing as lead authors.
- Policy and Advocacy**:** A doctoral degree also opens doors for PAs to work in policy development and advocacy efforts.



CHAPTER 9

Roles and Functions of Physician Associates

9.0 Roles and functions of Physician Associates

The integration of PAs at various levels of the Indian healthcare system, particularly in underserved and overburdened areas, can play a crucial role in addressing the shortage of healthcare providers while improving access to quality care.

Physician Associates are collaborative team members who work under the direction of a senior physician or surgeon. The level of supervision varies depending on the PA's education, experience, and the complexity of the tasks.

9.1 Levels of Supervision for PAs

1. Direct Supervision

In this scenario, the supervising physician/surgeon is physically present in the same location as the PA, providing guidance, assistance, and oversight during clinical procedures. This level is typically required for **new or less experienced PAs**, or for tasks that are complex or high-risk. The physician directly supervises the PA's work in real time.

2. Indirect Supervision

Under indirect supervision, the supervising physician/surgeon is available for consultation either on-site or remotely (telephonic or telemedicine channels) but does not need to be physically present during the procedure or patient care activities. This level of supervision is more common for **competent PAs** who have gained experience and can work more autonomously on routine and less complex/low risk tasks. However, the physician remains available for backup or advice when needed.

3. General Supervision

With general supervision, the supervising physician/surgeon provides overall oversight but may not be immediately available for consultation. The PA is trusted to handle patient care and clinical activities independently, especially in routine cases. This level is typically applied to experienced PAs capable of managing day-to-day care with minimal supervision. The physician may review cases periodically or provide remote consultation if necessary.

4. Supervision by Delegation

In this case, the supervising physician/surgeon delegates specific responsibilities to the PA based on their qualifications and experience. The PA works within predefined parameters, and while the physician may not be involved in every decision, they are available for guidance when needed. This is common for PAs who have advanced training or specialized experience. The PA is entrusted with significant responsibilities but still requires supervisory oversight for complex or uncertain cases.

9.2 Basic functions of PAs

PAs at all levels of healthcare typically perform a wide range of duties, including:

- Take medical histories
- Perform clinical assessments
- Order and interpret basic diagnostic tests
- Participate in the diagnosis and management of both acute and long-term care patients
- Provide emergency care
- Perform basic life support
- Coordinate referrals
- Perform minor surgical procedures
- Assist in complex surgeries
- Provide health advice to patients and their families
- Administer informed consent for procedures involving low risk
- Playing a key role in preventive healthcare
- Participate in research and educational activities

As PAs gain more experience or further their education, they are able to take on more complex and specialized roles within the healthcare team, always with the approval and guidance of their supervising physician or surgeon.

Below is a description of the roles and functions PAs can perform across various healthcare settings such as primary health care centers, NCD clinics, district hospitals, and tertiary healthcare centers.

9.3. Physician Associates in Primary Care

A. Clinical Role

PAs play a key role in enhancing the efficiency of the primary care team, supporting the diagnostic process, expediting decision-making, and improving patient outcomes.

Functions

1. **Patient Assessment and History Taking**
    - Conduct initial patient assessments, including taking medical histories and performing physical examinations.
    - Document and analyze the medical history to inform diagnosis and treatment plans.

2. **Diagnostic Tests**
    - Order, perform (specific tests) and interpret basic diagnostic tests.
    - Collaborate with specialists to discuss complex or ambiguous test results and refine diagnostic approaches

    .

3. **Diagnosis and Treatment**
    - Formulate differential diagnoses based on clinical findings and test results.
    - Develop and implement management plans for common and chronic medical conditions.
    - Perform minor procedures, such as wound care, suturing, bandaging, splinting, incision and drainage of abcesses, ear irrigation and removal of foreign bodies, drainage of subungal hematomas etc.,
    - Administer joint injections, intra-articular injections, and other minor therapeutic procedures.
    - Schedule, administer, and monitor vaccinations, ensuring timely immunization of patients according to age and health guidelines.

4. **Emergency Care**

   - Recognize and assess emergency situations, such as heart attacks, strokes, asthma attacks, snake bites, drowning, or anaphylaxis.
   - Provide first-aid measures, including administering life-saving medications (e.g., antiplatelet therapy, bronchodilators) and stabilizing patients until advanced care arrives.
   - Initiate and manage basic life support (BLS) and advanced cardiac life support (ACLS) in cases of cardiac or respiratory arrest.
   - Coordinate emergency transport, ensuring smooth handoffs to higher medical centers or specialized care.

5. **Chronic Disease Management**

   - Take an active role in managing patients with chronic conditions, including diabetes, hypertension, asthma, and chronic obstructive pulmonary disease (COPD).

     - Monitor treatment adherence, assess for complications, and adjust medications in collaboration with supervising physicians.
     - Provide continuous care to patients
     - Educate patients in lifestyle modifications to improve long-term health outcomes and prevent disease progression.
     - Consult with supervising physicians and refer patients (when necessary) to specialised care in cases of uncontrolled or complex conditions.

6. **Patient Outreach and Home Care**

   - Conduct home visits for patients with mobility limitations or severe illness, providing medical assessments, triage, and follow-up care.
   - Assist in reducing hospital readmission rates by managing patients' ongoing healthcare needs at home, supporting treatment adherence, and preventing exacerbations of chronic conditions.

7. **Pediatric and Geriatric Care**
    - Provide specialized care for pediatric and geriatric patients, managing common health conditions in these age groups (e.g., immunizations, growth monitoring, geriatric health assessments, and fall prevention).
    - Counsel caregivers and family members on age-appropriate healthcare strategies and preventative measures.

B. Administrative Roles

PAs can also contribute significantly to the administrative functioning of the healthcare system, improving operational efficiency.

Functions

1. **Coordination of Care**
    - Coordinate referrals and maintain communication between specialists, general practitioners, and other healthcare providers to ensure comprehensive patient care.
    - Monitor and track patient outcomes reducing loss to follow-up and fragmentation of care.

2. **Documentation and Record Keeping**
    - Maintain accurate and up-to-date patient records, ensuring compliance with healthcare regulations and improving communication within the healthcare team.

3. **Quality Assurance and Audit**
    - Participate in quality improvement initiatives by assessing clinical performance and patient satisfaction.
    - Assist in reviewing and updating practice protocols to improve patient outcomes.

C. Roles in Preventive Healthcare

PAs play a critical role in public health initiatives and the prevention of diseases through education, outreach, and active participation in health promotion.

Functions

1. **Patient Education and Counseling**
    - Provide counseling to patients and their families on lifestyle modifications, nutrition, exercise, mental health, and preventive care strategies to promote overall well-being.
    - Assist in creating personalized health promotion plans to address individual patient needs, including smoking cessation, weight management, and stress reduction.

2. **Health Screening and Preventive Care**
    - Assist in planning, organizing, and participating in community health screening camps (e.g., for hypertension, diabetes, and cancer).
    - Help identify at-risk individuals and direct them toward necessary preventive services, such as screenings, immunizations, or wellness exams.

3. **Community Health Initiatives**
    - Work with local health authorities to develop and implement public health initiatives tailored to the specific needs of the community.
    - Engage in social advocacy, promoting health policies that enhance access to care, especially for underserved populations.

D. Roles in Research and Education

Physician Associates contribute to the clinical and academic advancement of healthcare through involvement in research and continuous professional development.

Functions

1. **Clinical Research**
    - Participate in or lead research projects focused on improving patient care, clinical outcomes, and healthcare delivery.
    - Assist with the design, implementation, and analysis of research studies.

2. **Medical Education and Training**
    - Participate in training and mentoring medical students, residents, and fellow PAs, other healthcare providers in sharing clinical knowledge and experience.
    - Contribute to the development of educational materials and workshops for both healthcare professionals and patients.

3. **Evidence-Based Practice**
    - Stay current with medical literature, incorporating evidence-based practices into daily clinical routines.
    - Evaluate and apply the latest research findings to improve patient care protocols and treatment strategies.

E. Role in Collaboration and Teamwork

PAs function as integral members of multidisciplinary healthcare teams, working collaboratively with physicians, nurses, allied health professionals, and administrative staff.

Functions

1. **Multidisciplinary Collaboration**
    - Collaborate with healthcare teams to ensure holistic care for patients, contributing specialized knowledge and expertise in clinical decision-making.
    - Participate in team-based meetings, care planning, and case discussions to provide input on patient management.
2. **Patient Advocacy**
    - Advocate for patients' needs and preferences, ensuring they receive comprehensive and compassionate care.
    - Act as a liaison between patients and other healthcare providers, ensuring continuity and accessibility of care.

9.4. Role of PAs in District NCD Clinics

Role: PAs enhance the clinical capacity of district NCD clinics by managing routine care for chronic disease patients, which allows specialists to focus on complex cases.

Functions:

- **Clinical**:
    - Manage chronic NCD patients, including those with diabetes, hypertension, chronic kidney disease, and COPD.
    - Conduct regular screening for common NCDs in high-risk populations.
    - Adjust medications based on treatment protocols (with physician oversight).
    - Provide patient education on medication adherence, lifestyle changes, and self- management.
- **Administrative**:
    - Assist in monitoring disease progression, tracking vital parameters (e.g., blood pressure, blood glucose levels).
    - Ensure follow-up care and early detection of complications related to NCDs.

9.5 Role of PAs in District Cardiac Care Units

Role: PAs in cardiac care units (CCUs) assist in managing patients with acute and chronic cardiovascular conditions, providing critical care support.

Functions:

- **Clinical**:
    - Manage acute cardiac emergencies (e.g., myocardial infarction, angina, heart failure).
    - Order, perform (tests like echocardiograms), and interpret basic cardiac tests like ECG, echocardiograms, and chest X-rays.
    - Administer medications for acute cardiac events (e.g., antiplatelets, anticoagulants, diuretics).
    - Monitor and manage post-operative patients recovering from cardiac surgeries or interventional procedures (e.g., angioplasty, bypass surgery).
    - Educate patients on lifestyle changes to manage cardiovascular health (e.g., diet, exercise, medication adherence).

- **Administrative**:
    - Help with discharge planning and ensuring appropriate referrals to rehabilitation services.
    - Plan follow-up management, track patients and help patients conform to medical advice.

9.5. Role of PAs in District Day Care Centers for Cancer Patients

Role: PAs support cancer care delivery in daycare centers by assisting in treatment administration, patient monitoring, and providing supportive care.

Functions:

- **Clinical**:
    - Assist with chemotherapy infusions, ensuring patient safety and monitoring for adverse reactions.
    - Provide symptom management for cancer patients (e.g., pain relief, nausea management).
    - Offer supportive care for patients undergoing radiation therapy, including managing side effects.
    - Assist in pre-treatment assessments and ongoing evaluations during treatment cycles.

- **Administrative**:
    - Maintain accurate patient records regarding chemotherapy protocols, side effects, and follow-up visits.
    - Assist with scheduling chemotherapy cycles and coordinating referrals for palliative care.
    - Prepares regular clinical reports for self-reflection of the performance of the centre.

9.6 Role of PAs in CHC NCD Clinics

Role: PAs play an integral part in managing chronic diseases at Community Health Centers (CHCs), particularly through ongoing disease management and health promotion.

Functions:

- **Clinical**:
    - Monitor and manage chronic conditions such as diabetes, hypertension, obesity, and COPD.
    - Conduct preventive screenings for common NCDs in at-risk populations (e.g., blood pressure, glucose).
    - Provide patient education and implement lifestyle modification plans.
    - Offer first-line care for complications related to NCDs (e.g., diabetic foot ulcers, hypertensive crises).

- **Administrative**:
    - Maintain patient registers and track disease progression.
    - Participate in community outreach and screening programs.
    - Assist with referrals for higher-level care when necessary.

9.7. Role of PAs in District Hospitals

Role: PAs in district hospitals assist with the management of more complex cases, providing support in acute care and routine follow-up care.

Functions:

- **Clinical**:
    - Assist in acute care management, including post-operative care, trauma care, and emergency medicine.
    - Manage routine care for chronic disease patients (e.g., diabetes, hypertension).
    - Perform minor surgeries and procedures (e.g., suturing, biopsy collection, IV line insertions).
    - Provide pre-operative assessments and patient education for scheduled surgeries.

- **Administrative**:
    - Track patient progress and assist with discharge planning.
    - Ensure accurate documentation and manage referrals for patients requiring tertiary care.
- **Education and Research:**
    - Participate in clinical training for PA students or junior PAs.
    - Develop or assist in developing educational programs for clinical staff at the unit
    - Lead or assist in research related to process development and associate with clinical research.

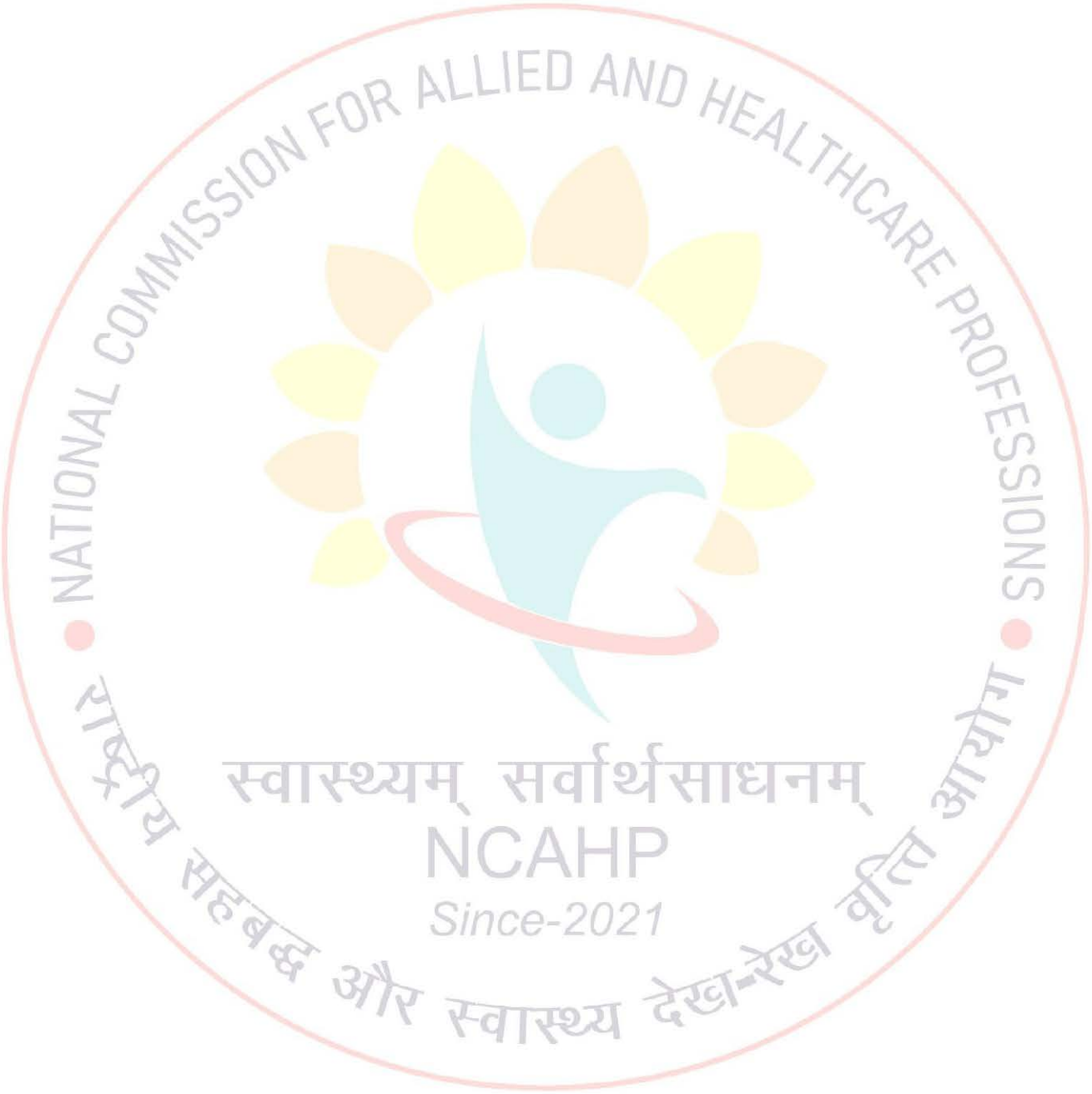
9.8. Role of PAs in Tertiary Healthcare Centers

Role: PAs in tertiary healthcare centers play a crucial role in assisting specialized teams, participating in complex patient management, and supporting clinical education and research.

Functions:

- **Clinical**:
    - Assist as first or second assistant in surgical procedures (e.g., cardiac surgery, organ transplants, oncology).
    - Perform minor surgeries and procedures. E.g., debridement, biopsies, wound suturing, circumcision etc.,
    - Perform minor orthopedic procedures like fracture immobilisations, administering joint injections etc.,
    - Monitor and manage critically ill patients in ICUs, emergency departments, and post-operative care units.
    - Participate in clinical rounds, contributing to diagnosis, treatment plans, and patient follow-ups.
    - Educate patients on the management of complex conditions and advanced therapies (e.g., chemotherapy, dialysis).
    - Participate and contribute to infection control team and morbidity and mortality meetings.

- **Administrative, research and education**:
    - Coordinate multidisciplinary teams to ensure holistic patient care.
    - Assist with referrals, patient admissions, and discharge planning.
    - Support clinical research and training programs
    - Participate in process improvement projects



CHAPTER 10

Physician Associate Job Description in Cardiology and Cardiac Surgery

10.0 Physician Associate job description in cardiology and cardiac surgery

The role and functions of PAs in tertiary care hospitals, particularly in cardiology and cardiac surgery, are well-established. The following job description for PAs in these specialties is based on the NBAH (National Board for Accreditation of Healthcare) levels. A similar job description should be developed for the primary care setting.

10.1 Cardiology

Throughout their career, the PA's clinical duties will be supervised by the Head of the Department of Cardiology or the cardiologist with whom the PA is assigned. It is the responsibility of the supervising cardiologist to define the PA's clinical duties in advance, ensuring they are aligned with the PA's level of education and competency and _level of supervision' is allocated for individual PAs or the tasks. The PA's skills will be reassessed annually, and updated duties will be assigned by the supervising cardiologist based on the reassessment.

Up to level nine, PA will perform many or all of the clinical tasks as listed under junior PA category as directed by the Departmental workload.

Note: Performing CPR is common to all NBAHS levels

JOB TITLE	**Junior Physician Associate**
JOB PURPOSE	Clinical-Assist cardiologists in the evaluation, diagnosis, management and rehabilitation of patients and in disease prevention Research-Assist cardiologists in implementing in-house research Projects
ACCOUNTABLE TO	Physician Associate Technical Head and/or Head of the department-Cardiology
QUALIFICATION AND EXPERIENCE	BPA 0-3 years
NBAHS LEVEL	Five

CLINICAL CARE RESPONSIBILITIES

In the out-patient setting/medical wards

- Secures a comprehensive patient health history and performs physical examination
- Order for relevant investigations limited to blood investigations, ECGs, Chest X- ray, treadmill test, echocardiogram
- Interpret ECGs and chest X-Rays
- Perform Treadmill test and echocardiogram and write reports
- Diagnose illness
- Prepare case reports, progress notes, discharge summaries
- Take daily rounds in wards and present cases to supervising cardiologist
- Plan and implement appropriate treatment plan in consultation with supervising cardiologist
- Prepare medication chart in consultation with supervising cardiologist
- Interrogates pacemaker functioning and performs programming on consultation with supervising cardiologist
- Counsel patients and families regarding disease, treatment plan, and prevention strategies. Explains cardiac procedures to patients
- Manages continuity of care for patients

In emergency care/coronary care unit/critical care unit

- Performs daily rounds and presents cases to supervising cardiologist
- Acquires vascular access for intravenous therapy and haemodynamic monitoring
- Assists in creating central line access
- Performs urethra catheterization
- Initiate treatment in emergency situations for common cardiovascular emergencies like the following: Acute coronary syndromes, acute cardiac failure, hypertensive crisis, acute pulmonary odema, cardiogenic shocks, cardiac arrhythmias, cardiac arrest
- Manages patients in consultation with supervising cardiologists
- Administers DC shocks, Prepares patients and assists in electrical cardioversion
- Manage mechanical and other forms of ventilations
- Writes progress notes and transfer orders

In cardiac catheterization laboratory

- Review the medical history and records any changes from the last case record
- Performs physical examination on the day of the interventional procedure
- Performs pre-procedural assessment
- Plan and records pre interventional orders including medications for all simple/routine procedures that are electively planned. For difficult/unusual cases/interventions, consults supervising cardiologist before giving orders.
- Assists in central arterial and venous punctures
- Assists in elective diagnostic and interventional procedures
- Manages anticoagulation, puncture site haemostasis, fluid and electrolyte balance
- Assist in managing complications
- Prepares procedure reports in consultation with the supervising cardiologist
- Plans transfer/discharge from recovery room
- Writes transfer orders
- Counsel patient and family on transfer on further plan
- Consults supervising physician about pre-procedural orders for complicated/unusual interventions
- Assists in cardiac screening camps

ACADEMIC ROLE

- Participate in departmental journal club activities

RESEARCH ACTIVITIES

- Assists in in-house research by designing studies, collecting and analysing data, and report generation

JOB TITLE	Senior Physician Associate
JOB PURPOSE	Clinical-Assist cardiologists in the evaluation, diagnosis, management and rehabilitation of patients and in disease Prevention Research-Assist cardiologists in implementing in-house research projects
ACCOUNTABLE	Physician Associate Technical Head and/or Head of the department-Cardiology
QUALIFICATION AND EXPERIENCE	BPA (3-6 years) MPA (0-3 Years)
NBAHS LEVEL	Six

Supervising junior physician associate's activities is common to all senior physician associates working in the below three settings

In outpatient settings/wards

- Conducts and interprets stress echocardiogram, tilt tests, Holter and loop recorders
- Prepares patients and assists in trans-oesophageal echocardiography, stress and contrast echocardiography
- Interrogates ICDs. Does programming in consultation with supervising cardiologist
- Manages pacemaker/heart failure clinics
- Liaise inter-departmental referrals

In cardiac catheterization laboratory

- Performs peripheral venous and carotid artery ultrasound and Doppler
- Performs elective coronary angiographies
- Assists in cardiac catheterizations, coronary angioplasties, therapeutic interventions for other vascular diseases, congenital and valve diseases, pacemakers and device implantations
- Manages emergencies in the catheterization lab and recovery rooms

In emergency care/coronary care unit/critical care unit

- Prepares and performs elective pharmacological and electric cardioversion
- Creates vascular access of central line
- Assists in pericardiocentesis and drain insertions
- Prepares and presents cases for morbidity and mortality meetings

ACADEMIC ROLE

- Participates in journal club meetings
- Impart clinical training to physician associate students
- Mentors and supervises junior physician associate

RESEARCH ACTIVITIES

- Designs,executes in-house research projects in consultation with cardiologists. Collects data, performs statistical analyses and write report.

JOB TITLE	**Assistant Manager (BPA)/Assistant Professor (MPA/PhD)**
JOB PURPOSE	Clinical-Assist cardiologists in the evaluation, diagnosis, management and rehabilitation of patients and in disease prevention, manages clinics Research-Take the lead in designing and implementing in- house research projects
ACCOUNTABLE TO	Clinical and Research-Head of the department-Cardiology Academics-Professor/Dean-Academics
QUALIFICATION AND EXPERIENCE	BPA (6-8 years) MPA (0-5 Years) PhD (0-3 years)
NBAHS LEVEL	Seven

CLINICAL RESPONSIBILITIES

- Same as for level six, and Assists in stress testing in nuclear imaging, performs stress and contrast echocardiography and contrast echocardiography
- Attends to calls from post cardiac surgery ICU/wards, discuss management plan with supervising cardiologists and implements treatment plan
- Plans and implements health screening camps in consultation with head of the department/supervising cardiologist and technical head-Physician associate.
- ICD interrogations and programming
- Assists in the insertion and management of intra-aortic balloon pump

ACADEMIC ACTIVITIES

- Coordinate journal club activities
- Impart clinical training to physician associate students
- Mentors and supervises junior and senior physician associate
- Participates as faculty in PA education programme (Selection for faculty position by academic panel)

RESEARCH ACTIVITIES

- Plans and executes research projects in consultation with the supervising cardiologist/technical head-Physician associate. Participation involves active contribution in study design, data management and other activities as listed for level six

ACADEMIC/ADMINISTRATIVE RESPONSIBILITIES

- Coordinate journal club activities
- Impart clinical training to PA students
- Mentors and supervises junior and senior PA
- Participates as faculty in PA, nursing and other allied health professional's education programme (Selection for faculty position by academic panel)

JOB TITLE	**Deputy Manager (BPA)/Associate Professor (MPA/PhD)**
JOB PURPOSE	Clinical-Assist cardiologists in the evaluation, diagnosis, management and rehabilitation of patients and in disease prevention, manages clinics Research-Take the lead in designing and implementing in-house research projects
ACCOUNTABLE TO	Clinical and Research-Head of the department-Cardiology Academics-Professor/Dean-Academics
QUALIFICATION AND EXPERIENCE	BPA (>8 years) MPA (5-8 Years) PhD (>3 years)
NBAHS LEVEL	Eight

CLINICAL RESPONSIBILITIES

- Same as for level seven, and
- Performs pericardiocentesis and drain insertions

RESEARCH ACTIVITIES

- Plans and executes research projects in consultation with the supervising cardiologist/technical head-Physician Associate. Participation involves active contribution in study design, budgeting, protocol development, data management and other activities as listed for level six

ACADEMIC/ADMINISTRATIVE RESPONSIBILITIES

- Coordinate journal club activities
- Impart clinical training to PA students
- Mentors and supervises junior and senior PAs and assistant managers
- Participates as faculty in physician associate, nursing and other allied health professional‘s education programme (Selection for faculty position by academic panel)
- Does performance assessment of junior and senior PAs

JOB TITLE	**Manager (MPA)/Professor (PhD)**
JOB PURPOSE	Clinical-Assist cardiologists in the evaluation, diagnosis, management and rehabilitation of patients and in disease Prevention Research-Take the lead in designing and implementing in- house research projects Manages clinics
ACCOUNTABLE TO	Clinical and Research-Head of the department-Cardiology and
QUALIFICATION AND EXPERIENCE	MPA (>8 years) PhD (3-5 years)
NBAHS LEVEL	Nine

CLINICAL RESPONSIBILITIES

- As for level 8
- Inserts and manages intra-aortic balloon pump

ACADEMIC/ADMINISTRATIVE

- As for level eight, and
- Mentors and supervises level 8 PAs, does performance assessment
- Assists cardiologists in planning and conducting educational workshops
- Plans and implements community health awareness programmes
- Supervise the implementation of all the policies, protocols and procedures within the cardiac unit.
- Reviews effectiveness of programmes, policies, protocols and prepares improvement guidelines
- Maintenance of infection control and quality control practices as per unit protocols
- Delegates duties for PAs and supervises their activities
- Performs periodic audit of clinical performances of level five, six and seven PAs.

RESEARCH

- As for Level 8 and,
- Budgeting
- Protocol development
- Overviews all research activities within the department and assists the Physician Associate Director/Dean

JOB TITLE	**Technical Head/ Director/ Director/Dean/Principal**
ACCOUNTABLE TO	Clinical-***Head of the department-Cardiology*** Research-***Head of the department-Cardiology*** (if working within the cardiology department) Accountable to ***Director of the Institution*** if leading the Institution‟s Research Department Academics-***Dean-Allied Health Sciences***
QUALIFICATION AND EXPERIENCE	>5 years post PhD
NBAHS LEVEL	Ten

CLINICAL RESPONSIBILITIES

As for level nine

ACADEMIC/ADMINSTRATIVE RESPONSIBILITIES

- Plan academic activities of the department Hires physician associates
- Performs career assessments of physician associates and grades performances for career advancements

RESEARCH ACTIVITIES

- Hires scientific and technical staff
- Mentors and supervises research activities of level nine physician associates and other research staff
- Plans budgets for departmental research activities Promotes and facilities collaborative research projects
- Build and provide sufficient support for researchers to conduct quality research Ensures accepted standards of research and ethics are met.

11.2 Job description for cardiothoracic surgery PAs

PHYSICIAN ASSOCIATE (BPA)

- **JOB TITLE:** PHYSICIAN ASSOCIATE
- **JOB PURPOSE:** Assist cardiothoracic surgeons in preoperative, intraoperative and post operative care of the patients
- **ACCOUNTABLITY:** Head of Department/ Senior Cardiothoracic surgeon
- **QUALIFICATION**: BPA Physician Associate

CLINICAL CARE RESPONSIBILITIES:

- Work as first or second assistant in various adult and pediatric surgeries
- Harvest saphenous veins and radial artery
- Closure of chest and leg wound
- Prepare operation notes and discharge summaries
- Harvest and prepare homograft
- Involve in postoperative management of the patients
- Record daily progress notes in ICU
- Involve in daily dressing and wound management
- Removal of chest tubes
- Extubation
- Insertion of IV lines, arterial lines
- Insertion of urinary catheter
- Basic cardiopulmonary resuscitation
- Suture and pacing wire removal

CLINICAL OUTCOMES RESPONSIBILITIES:

- Pre operative Patient education and post operative counselling
- Maintain strict asepsis in the OR
- PHYSICIAN ASSOCIATE (MPA)

1. **JOB TITLE:** Senior Physician Associate/Assistant Professor
2. **JOB PURPOSE:** Clinical care, Teaching and Research in cardiac sciences
3. **ACCOUNTABLE TO**: Head of Department
4. **QUALIFICATION:** MS Physician Associate

CLINICAL CARE RESPONSIBILITIES:

- Preoperative clinical assessment of patients
- Assist as first assistant in all cardiac surgeries
- Harvest all conduits for coronary surgery – saphenous veins, radial artery, internal mammary artery
- Perform endoscopic vein harvesting if facility available
- Providing expert support in the OR for conduit harvesting and assisting
- Open and close chest
- Establish cardiopulmonary bypass
- Handle emergency crisis in OR
- Insertion and removal of ICD
- Insertion and management of IABP
- Tracheostomy tube change and removal
- Surgical wound assessment and care – debridement and resuturing
- Interpretation of ECG and Chest X-rays, routine hematological and biochemistry evaluation, ABG analysis, Manage acid-base, fluid and electrolyte balance, Assess nutrional needs of the patients-oral and parenteral
- Advanced cardiac life support
- Supervises the activities of junior PAs
- Guiding the staff and students on asepsis, infection control and quality control standards as per unit policies
- Case presentation
- Post operative care of patients-Identification and management of haemodynamic and rhythm disorders
- Operate mechanical ventilator
- Intubation and extubation

- Central line placement
- PA catheter placement
- Thoracentesis
- Perform direct biopsies and assist in VATS
- Prepare death summaries and discharge summaries of patients who have complicated course in the hospital

CLINICAL OUTCOMES RESPONSIBILITIES:

- Pre operative Patient education and post operative counselling
- Maintain strict asepsis in the OR

ADMINISTRATIVE RESPONSIBILITIES

- Evaluates the quality of care provided
- Performs human resource related duties (e.g. employee evaluation, need for additional manpower, recommending promotions, compensation increases, conduct ongoing employee training and staff grievance redressals)

TEACHING RESPONSIBILITIES:

- Teaching of undergraduate & postgraduate students (BS & MS PA) students
- Coordinating all academic programs, e.g. clinical and theoretical teaching
- Conducting assessments and examinations for BS candidates and interns
- Teaching and guiding nurses and paramedical staff to enhance their knowledge and improve their functioning

RSEARCH RESPONSIBILITIES:

- Participating in research projects and clinical trials
- Participate in continuing medical education programs and enhance professional development activities
- Present papers in surgical conferences
- Enforcing ethical research standards

11.3 Doctorate Physician Associate

1. **JOB TITLE:** Professor or Chief Physician Associate
2. **JOB PURPOSE:** Clinical Care, Teaching and Research in cardiac science
3. **ACCOUNTABLE TO**: Head of Department/ Medical Superintendent/CEO
4. **QUALIFICATION**: PhD- Cardiac Sciences

CLINICAL RESPONSIBILITIES:

- Perform minor procedures independently – wound debridement, wound resuturing, sternal rewiring, sternal wire removal, Re-exploration
- Establish cardiopulmonary bypass and ECMO
- Emergency chest reopening
- Pericardiocentesis
- Organ harvesting for transplant

ADMINISTRATIVE RESPONSIBILITIES

- Supervise the implementation of all the policies, protocols and procedures within the cardiac unit
- Maintenance of infection control and quality control practices as per unit protocols
- Supervise the activities of all PAs and delegate distinctive roles
- Overall care of patient outcomes, patient satisfaction scores and patient safety issues
- Perform human resource related duties (e.g. recommending promotions, compensation increases, conduct ongoing employee training and staff grievance redressals)
- Formulate a surgical unit policy and procedures manual to ensure quality clinical care and quality administrative governance of the unit

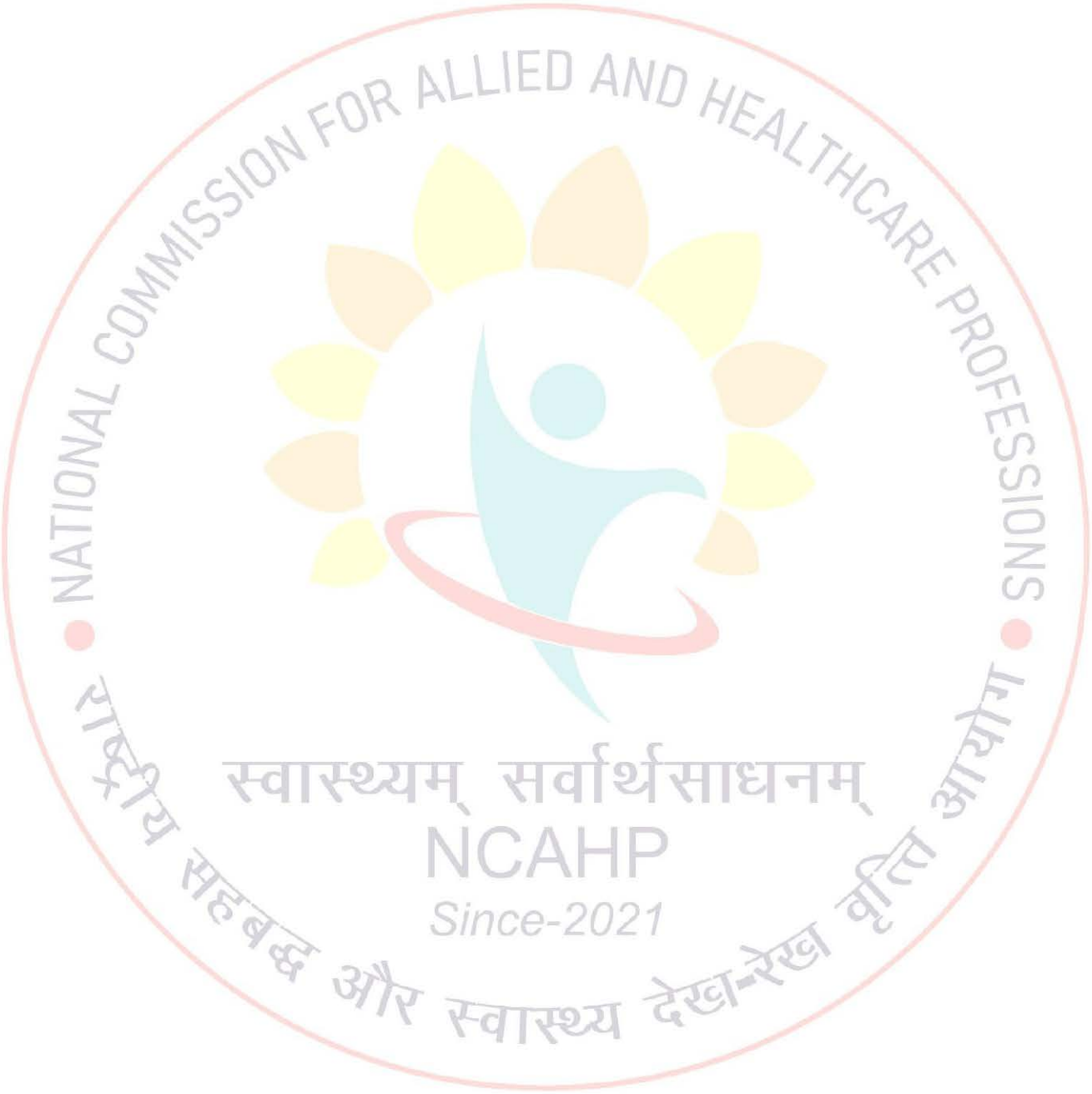
- Implement departmental policies and procedures and recommends changes as necessary. Coordinates activities of the surgical unit with the other departments/facilities of the organization
- Keep abreast of current trends in surgical techniques and management to ensure ongoing organizational change and learning to improve patient care and outcomes

TEACHING RESPONSIBILITIES:

- Teaching of undergraduate (BPA & MPA students) and coordinating all academic programs, e.g. clinical and theoretical teaching, conducting assessments and examinations for the diploma, BPA & MPA candidates and interns with documentation as needed
- Planning and implement ongoing staff educational and skills training programs with continual assessments and monitoring outcomes thereby ensuring on-going organizational learning in consultation with the head of department and nephrology staff

RSEARCH RESPONSIBILITIES:

- Encouraging, conducting and mentoring research
- Encouraging research methodology training among the students and faculty
- Enforcing ethical research standards
- Authorship of manuscripts for journal publications



REFERENCES

1. Narayan, K Kar, S Gupta, N. From 'Paramedics' to 'Allied Health Professionals': Landscaping the Journey and Way Forward. Public Health Foundation of India: New Delhi, India, 2012.
2. Allied Health Professions Federation. AHPs involvement in health and social care 2011. Available from: http://www.ahpf.org.uk/files/ahpf_gov_briefing_v7_09-05-11.pdf.
3. Narayan. K. How many doctors it takes to fix India's healthcare glitches? Deccan Herald [Internet]. 2014. Available from: http://www.deccanherald.com/content/381371/how-many- doctors-takes-fix.html.
4. Introduction to clerkship 1999. Available from: https://umanitoba.ca/faculties/medicine/media/missiion_goals_object_class_2011.pdf.
5. Standards of practice for ACT Allied Health Professionals 2005. Available from: http://health.act.gov.au/c/health?a=dlpubpoldoc&document=863.
6. Pamela Mitchell et al. Core principles and values of effective team based healthcare2012. Available from: https://www.nationalahec.org/pdfs/VSRT-Team-Based-Care-Principles-values.pdf.
7. Professionalism in nursing, midwifery and the allied health professions in Scotland. Scottish Government, 2012 978-1-78045-925-7.
8. Nursing & Midwifery Council .Standards for competence for registered nurses. Available from: http://www.nmc-uk.org/Documents/Standards/Standards%20for%20competence.pdf.
9. Social Accountability- A vision for Canadian medical schools Available from: https://www.afmc.ca/fmec/pdf/sa_vision_canadian_medical_schools_en.pdf.
10. University of Manitoba. Faculty of medicine teaching handbook2004. Available from: umanitoba.ca/faculties/medicine/media/teaching_handbook04.doc.
11. Medical Council of India. Vision 2015. Published March 2011. Available from: http://www.mciindia.org/tools/announcement/MCI_booklet.pdf.
12. Sherwin J. Competency-Based Medical Education Takes Shape2011. Available from: https://www.aamc.org/newsroom/reporter/april11/184286/competency-based_medical_education.html.
13. Bushway D, Everhart D. Investing in Quality Competency-Based Education2014. Available from: http://www.educause.edu/ero/article/investing-quality-competency-based- education.
14. Brookfield, S. D. Self-Directed Learning In: YMCA George Williams College ICE301 Lifelong learning Unit 1 Approaching lifelong learning. London: YMCA George Williams College; 1994.
15. Ramnarayan K, Hande S. Thoughts on Self-Directed Learning in Medical Schools: Making Students More Responsible 2005. Available from: http://education.jhu.edu/PD/newhorizons/lifelonglearning/higher-education/medical-schools/.

16. Harvey, B. J., Rothman, A. I., Frecker, R.C. Effect of an undergraduate medical curriculum on students' self-directed learning. Academic Medicine. 2003; 78(12): 1259-65.
17. Credit-Based-Grading-System for Assessment of Students. Available from: http://www.presiuniv.ac.in/web/exam_assessment.php.
18. Manual on semester based, credit and grading system Mumbai: University of Mumbai 2011. Available from: http://www.mu.ac.in/1_Manual_SCGS_Arts_09-06-2011.pdf.
19. Vertical Integration2015. Available from: http://www.mcw.edu/Medical-School/Curriculum/Traditional-Curriculum/Vertical-Integration.htm.
20. Rick TJ, Ballweg R. Physician Assistants and the Expanding Global Health-Care Workforce. Am J Trop Med Hyg. 2017 Sep;97(3):643-644. doi: 10.4269/ajtmh.17-0176. Epub 2017 Jul 19. PMID: 28722636; PMCID: PMC5590609.
21. Cobb N, Meckel M, Nyoni J, Mulitalo K, Cuadrado H, Sumitani J, et al. Findings from a survey of an uncategorized cadre of clinicians in 46 countries – increasing access to medical care with a focus on regional needs since the 17th century. World Health Popul. 2015. September;16(1):72–86
22. Hooker RS, Everett CM. The contributions of physician assistants in primary care systems. Health Soc Care Community. 2012 Jan;20(1):20-31. doi: 10.1111/j.1365- 2524.2011.01021.x. Epub 2011 Aug 18. PMID: 21851446; PMCID: PMC3903046.
23. Hu, X., Coplan, B., Barnes, H., Smith, N., Essary, A., & Dill, M. (2024). Physicians working with physician assistants and nurse practitioners: perceived effects on clinical practice. *Health affairs scholar*, *2*(6), qxae070. https://doi.org/10.1093/haschl/qxae070
24. Hooker RS, Berkowitz O. A global census of physician assistants and physician associates. *JAAPA*. 2020;33(12):43-45. doi:10.1097/01.JAA.0000721668.29693.36
25. Kuilman L, Sundar G, Cherian KM. Physician assistant education in India. *J Physician Assist Educ*. 2012;23(3):56-59. doi:10.1097/01367895-201223030-00010